

Differentiation and Grouping in Mathematics

2005-2006

**Differentiation and Grouping
in
Mathematics
2005-2006**

Committee

Jay Corrigan	New Market Elementary	
Leigh Friedman	New Market Elementary	
Elaine Lazzaro	Science/Math Teacher Specialist	Chair
Beverly Long	New Midway Elementary	
Kimberly Mazaleski	North Frederick Elementary	
Erin McCullough	South Frederick Elementary	
Christine Ohm	Kemptown Elementary	
Shirley Olsen	Whittier Elementary	
Anne Rhodes	Walkersville Elementary	
Katie Sheffler	Middletown Elementary	

Editors

Chris Horne	Science/Math Teacher Specialist
Elaine Lazzaro	Science/Math Teacher Specialist
Colleen Mayo	Science/Math Teacher Specialist
Nelson Palmer	Math Curriculum Specialist, K – 5
Katherine Swire	Science/Math Teacher Specialist

Vision of Mathematics

Mathematics is important. All children must learn to think mathematically, and they must think mathematically to learn.

Mathematics describes the world in terms of size and shape and allows us to appreciate the beauty of its patterns. It has facilitated the development of science, technology, engineering, business, and government.

The Frederick County Public School System educates its students to value, understand, and use mathematics at school and in their world.

Students enjoy learning and doing math. They are confident in their ability to learn and apply math. Students are actively involved in developing their own understanding of math. They are able to demonstrate their understanding.

Teachers are students of mathematics. They possess the confidence and knowledge to facilitate math learning. Teachers demonstrate an enthusiasm for mathematics. Teachers think about students' thinking in math in order to provide an environment that offers every child opportunities to grow mathematically.

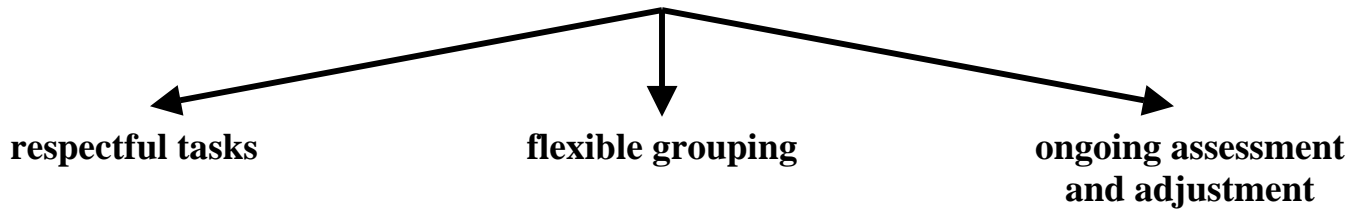
The school and the community value math education. Together they support curriculum and instruction that offer students opportunities to learn mathematics concepts and procedures with understanding.

Differentiation of Instruction

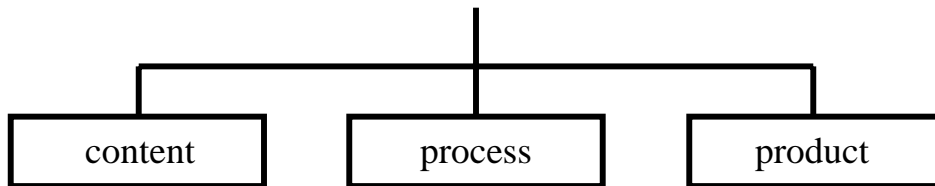
is a teacher's response to learners' needs



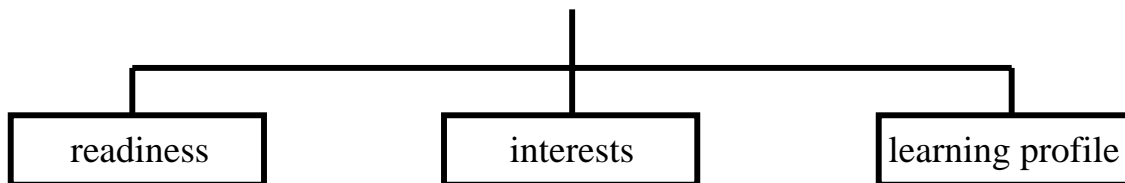
**guided by general principals of differentiation
such as:**



Teachers can differentiate



according to students'



through a range of instructional and management strategies.

Grouping for Mathematics Elementary Math Position Statement

Position:

Students should be organized into heterogeneous math classes.¹ The goal in math instruction must remain focused on maintaining consistently high expectations for all students, and meeting and/or enriching the enrolled grade-level expectations. In order to achieve this goal, teachers must differentiate instruction.

Rationale:

Heterogeneous classes with appropriately differentiated instruction have both academic and social advantages for all students.

- Creativity, stimulating discourse, and diverse thinking can be found in heterogeneous classes that have a balance of procedural, factual and conceptual understanding. Students benefit from a multi-faceted approach to instruction (Corbett Burris, Heubert & Levin, 2004).
- Students in heterogeneous classrooms can be grouped with other students who share their particular interest, readiness level, or learning profile (Spear, 1994)
- Heterogeneous grouping creates an environment in which teachers must be responsive to individual student needs.
- Research reveals that students in heterogeneous classes outperform those grouped by ability. Additionally, students grouped heterogeneously have better behavior and demonstrate high levels of respect and responsibility among classmates. (University of Sussex, 2007)
- Students in heterogeneous classes have access to higher level thinking and questioning and therefore have a greater opportunity to meet grade level standards.

¹ FCPS recognizes that the Magnet program utilizes a grouping structure unique to the Magnet program.

Recommendations:

- Ensure that a shared vision of instruction and grouping is established with the staff of a school.
- Communicate the grouping structure to parents, assuring them that their child will receive the appropriate challenge, support, and preparation for success, both current and future.
- Address the needs of all students by differentiating their classroom instruction based on the ongoing assessment of students' readiness, interests, and learning profile.
- Flexibly group students within a classroom to provide appropriate challenge for each student's current needs.
- Maintain a schedule for ongoing professional development related to successful differentiation strategies.
 - Establishment and facilitation of a learning community.
 - Management (materials and behavior) techniques
 - Use of data and frequent, on-going assessment for diagnosis and planning
 - Models of planning and implementation
 - Strategies and structures of differentiation
 - Components and continuum of math skill development
 - Math content (and grade-level expectations) and pedagogy
 - Resources for grouping and differentiation

Grouping for Math References

- Corbett Burris, C., Heubert, J., & Levin, H. (2003). Math acceleration for all. *Educational Leadership*. 68-71.
- Hill, D. (2004). The mathematics pathway for all children. *Teaching Children Mathematics*. 127-133.
- National Council of Teachers of Mathematics. (2000). *Principles and Standards for School Mathematics*. Reston, VA: NCTM.
- Spear, R. (1994). Teacher perceptions of ability grouping practices in middle level school. *Research in Middle Level Education*, 18, 117-130.
- Sutton, J., & Krueger, A. (Eds.). (2002). *EDThoughts: What we know about mathematics teaching and learning*. Aurora, CO: Mid-continent Research for Education and Learning.
- Tomlinson, C. (1999). *The differentiated classroom: Responding to the needs of all Learners*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Tomlinson, C. (2001). *How to differentiate instruction in mixed-ability classrooms*. Alexandria, VA: Association for Supervision and Curriculum Development.
- University of Sussex (2007, September 21). Grouping Kids By Ability Harms Education, Two Studies Show. *ScienceDaily*. Retrieved September 30, 2007, from <http://www.sciencedaily.com/releases/2007/09/070915104849.htm>

Grouping in Mathematics

Position Statement

Discussion Questions

Discussion questions are designed to be used to help facilitate discussion after reading the Elementary Math Position Statement. They may be used in a total group discussion or as part of a team discussion. The discussion questions are placed in a chart so that questions may be cut apart and distributed among tables for group discussion and sharing. This is just one suggestion for their use.

What first steps will you take to begin differentiating instruction, or to improve your current differentiated structure?

How does the grouping position compare to how this school currently groups its students in math?

What evidence do you use for making grouping decisions in mathematics?

What aspects of the grouping statement require further clarification?

What methods are currently used to differentiate instruction in mathematics in this school?

What resources does this school currently possess that support differentiated instruction?

What changes could this school or your teams make to better align mathematics instruction with the position statement?

What barriers do you foresee that might hinder the implementation of the grouping structure? What can be done to remove those barriers before they start?

How does this position reflect the beliefs of Ruby Payne?

What support from the county, curriculum or teacher specialists, other teachers, or your building level administrator will this school and/or team need to begin teaching mixed-ability math classes and differentiating instruction?

How can you effectively communicate the benefits of flexible grouping in mathematics to parents?

What other questions about flexible grouping in math do you have?

How does flexible grouping and differentiation apply to the other curricular areas?

Weekly/Long Term Planning Guide

Indicator _____ Grade Level _____ Date _____

Day/Week	Enrolled Grade Level Plan	Enrich/Reteach Plan	Resources/Material
Day 1		Group 1	
		Group 2	
Day 2		Group 1	
		Group 2	
Day 3		Group 1	
		Group 2	
Day 4		Group 1	
		Group 2	
Day 5		Group 1	
		Group 2	

Daily/Lesson Planning Guide

Topic _____ Date _____

Indicators/Objectives - What should students know and be able to do?	Vocabulary	
Guiding/Essential Question - What is the question the students will be expected to answer?		
Warm-up (total group or small group)	<ul style="list-style-type: none"> *quiz/test *survey *brainstorm *self-assessment *concept formation <ul style="list-style-type: none"> *KWL *journal 	
Pre-Assessment - How will I figure out what students already know or are able to do?	<ul style="list-style-type: none"> *lecture *presentation *demonstration *video *guest speaker <ul style="list-style-type: none"> *field trip *text 	
Grouping Decisions – How will I use the results of the pre-assessment to flexibly group my students?	<p>Consider:</p> <ul style="list-style-type: none"> <i>total group</i> <i>individual</i> <i>partners</i> <i>small group</i> <i>random</i> <i>homogeneous</i> <i>heterogeneous</i> <i>interest</i> <i>task</i> <i>student choice</i> <i>learning profile</i> <i>readiness</i> <p><u>Strategies</u></p> <ul style="list-style-type: none"> *centers *projects *contracts *inquiry *problem based *independent study *compact/enrich 	
Closure/Assess		
<ul style="list-style-type: none"> *exit card *quiz/test *journal *observation *products *presentation *checklist 		

Instructional Terms

Strategy/Term	Definition	Example
Acceleration	Students move through one or more subject areas to achieve mastery more quickly than in a standard school program. <i>(This is especially a consideration for below-grade level students in order to help them meet grade level expectations.)</i>	<i>A below grade level student has learned to represent halves, thirds and fourths of a set. The teacher will then accelerate the student to the next indicator on the planning tool which is to represent tenths of a set.</i>
Assessment	The ongoing collection and use of student data to plan responsive instruction.	<i>Observation Portfolio Paper-pencil Quiz/Test KWL chart Interest Inventories Questioning Conferencing Most Difficult First” Performance Assessment Student Self-Assessment</i>
Audit Cards	An assessment tool where students document their work at a station or center. Students complete the audit card and leave it at the center or station for teacher review.	<i>Tell what you learned or found useful. Possible questions on audit card could be: What would you change about this activity? What did you do at this center?</i>
Curriculum Compacting	A 3-step process implemented by the teacher for one or more students who have mastered portions of the essential curriculum: <ul style="list-style-type: none"> • pre-assess content to be studied • modify learning activities so that student receives instruction in what he/she does <u>not</u> already know • provide alternate learning activities that offer meaningful and challenging enrichment 	<i>During a unit on fractions, a third grade class is learning to read write, or represent halves, thirds, or fourths of a set or region using symbols, words, or models. A pre-test indicates that a small group of students has already mastered this indicator. The teacher plans activities for this group to enrich these skills through application activities. <u>After enrichment</u>, this group could begin working on fractions through tenths which is a fourth grade skill.</i>
Enrichment	Develops a deeper understanding of content matter and applied processes that support improving student attitudes and appreciation of math.	<i>When learning about tallies, a child or group writes a question to investigate, surveys classmates to collect data and displays data.</i>
Exit Cards	An assessment tool used to gather information on student readiness, interests and learning profiles. Students respond on cards to a prompt and turn them in at the end of a lesson. Information is used to determine instructional groups and activities.	<i>Give students an index card. Ask them to create a number line from 0-1. Using given fractions, place them in order on the number line, and summarize what you have learned today.</i>

Differentiation Terminology

Strategy/Term	Definition	Example
Most Difficult First	A pre-assessment strategy whereby students are given the opportunity to do the most difficult items on the assessment first to demonstrate mastery or understanding of a grade level concept. If students are able to demonstrate mastery, then they are free to select enrichment activities for that period of time.	<i>Telling time by 5 minute intervals. Teacher will assess student knowledge of time by presenting most challenging items first. Those students who demonstrate mastery, immediately move to other appropriate related enrichment activities for time, such as telling time to the minute.</i>
Respectful Tasks	All students are offered tasks that look and are equally interesting, equally important, and equally engaging and respect the appropriate levels or needs of each student.	<p><i>Students will use same shopping advertisement.</i></p> <ul style="list-style-type: none"> • <i>Reteach group might need to count bills and coins and put them together to find total.</i> • <i>On grade group will use coins and bills to solve a problem based on the shopping advertisement</i>

Management Terms

Strategy/Term	Definition	Example
Choice Board	A strategy that allows the teacher to “direct traffic.” Students make a work selection from a choice board, which is targeted toward students’ needs. Assignments should be changed as student needs dictate.	<i>Children are given a choice board that contains a list of possible activities they can complete to learn about volume. For example, students can choose to complete an inquiry lesson where they measure volume using various containers, read from a textbook on measuring volume, or watch a video in which the steps are explained. The activities are based on the following learning styles: visual, auditory, kinesthetic, and tactile. Students must complete two activities from the board and must choose these activities from two different learning styles.</i>
Reading and Study Buddies	Students are assigned partners who can assist each other in reading an assignment or studying/reviewing subject matter.	
Student Expert Desks	Students who have questions know that they should go for help to a designated “student helper” or “expert”.	<i>Designated helper or expert wears a visor or badge. Students go to this student for assistance. All students should be given a turn as “expert”.</i>
Student or Adult Mentors	Students work with a resource teacher, media specialist, parent volunteer, older student, or community member who can guide their growth in a particular area of interest or talent.	
Task Cards	A tool used to create individual or small group assignments. Directions for student activities are recorded on cards and students complete assignments independently.	<i>(Could color code task cards to match level of difficulty or to match flexible groups.)</i>
“Three Before Me”	Students are instructed to check with three other students before coming to the teacher for help to prevent interruptions during individual and small group instructional times.	

Strategy Terms

Strategy/Term	Definition	Example
Anchor Activities	Ongoing assignments (sometimes long-term) tied to the curriculum which students work on independently when they finish other assignments. These reinforce concepts taught and are completed by a given deadline.	<i>When learning multiplication objectives, students can shade multiples on hundreds charts and analyze and record patterns..</i>
Extension Menu	An array of independent learning activities in a 2x2, 2x3, or 3x3 format (boxes) to provide students with choices for extending or enriching the essential curriculum.	<i>See Science Tradebook lessons or G & T section (link) of fcpsteach.org.</i>
Flexible Grouping	Students are placed in instructional groups for specific skills, units of study, or other learning opportunities based on readiness, interest, or learning profile. These arrangements create temporary groups for an hour, a day, a week, or a month.	<i>The teacher may assign groups based on readiness for direct instruction on algebraic concepts, and/or allow students to choose their own groups for projects that investigate famous mathematicians.</i>
Independent Projects/ Investigations	Individual or small group investigations about a topic of interest to the student. The development of a product for sharing information learned is presented to an appropriate audience. Projects should include application of many math skills.	<i>Teacher poses question: Does the school playground currently meet the needs of students? Students take surveys, measurements, etc. based on differentiated levels to draw conclusions. Results and conclusions are presented to principal or appropriate audience. This project can be done across grade levels.</i>
Interest Centers/ Interest Groups	Centers or groups that are differentiated by level of complexity, independence required and/or student interest.	<i>Centers can focus on specific math skills, such as addition, and provide activities that are high interest, such as counting jelly beans or looking for math in Harry Potter books. Groups can work in small groups to research a math topic of interest such as how geometry applies to architecture or how math is used in art.</i>
Learning Centers	Stations or collections of instructional materials provided for learners to explore topics or practice skills.	<i>A center might include catalogs of toys where children problem solve and use several skills in finding solutions to problem posed.</i>

Differentiation Terminology

Strategy/Term	Definition	Example
Learning Contract	Agreement between student and teacher that grants the students certain freedoms and choices about completing tasks, yet requires student to meet specifications.	<i>A student decides to follow a football team over a two-month period and make inferences about players' performances based on their scoring patterns and physical characteristics. The student, with the teacher's guidance, develops a contract for collecting and analyzing the data and conducting research about football. The student decides to create a power point presentation to present his/her findings to the class.</i>
Mentorship	Observation of and interchange with an expert in a selected career field.	<i>Student or students might have an e-mail conversation with an expert in a math related field, a high school math student, etc.</i>
Tiered Assignments	Two or three activities or assignments addressing essential understandings, key skills and important concepts, but varying in levels of complexity based on student needs/levels.	<i>In a unit on measurement, some students are taught basic measurement skills, including using a ruler to measure the length of rectangular shaped objects. Other students can apply measurement skills to perimeter of irregular shaped objects.</i>
Pre-Teaching	Preparing students for upcoming concepts. Giving them background information before there is instruction.	<i>Next week you will be ready to teach counting coins to \$1. In one small group, you give them the opportunity to explore this prior to next week's on grade lessons.</i>

Elementary Mathematics
Differentiation / Flexible Grouping / Mixed-ability Classrooms
FAQ's

Rationale

Why not have homogeneous below level classes?

Tracking for below level groups is one of the most destructive aspects of homogeneous groups. Several negative things occur when below-level students are grouped together. First, the over-riding trend is that tracked students are not accelerated (usually growth is not even maintained) and therefore never move in the direction of grade-level mastery. Second, it becomes difficult on the part of the teacher to retain an accurate view of what grade level standard looks like. Third, students in below level groups typically don't have access to higher level thinking and questioning. More often, these classes solely address functional skills and low-level learnings. Finally, homogeneously grouped students don't have access to a variety of strategies and thought.

Why not have homogeneous above level classes?

It would seem that it is more convenient (perhaps easier) for the teacher to provide challenges for homogeneously grouped above-level students, and at times it is beneficial for children to have access to high levels of thinking from other above level students. However, "Heterogeneous classrooms provide greater learning opportunities for low-ability students, without being detrimental to high-ability students" (Strahan, Hartman, and Sikes). Heterogeneous grouping practices allow for "varied, broad peer interactions to allow students to socialize with, model, and adjust to a variety of peer influences" (Spear 1992)

It is most important that children first master the grade level curriculum. Often master of the grade level expectations is assumed by the teacher, rather than demonstrated by the students. In higher ability classes, the depth of understanding for students believed to be above level is often overlooked, again assuming that conceptual understanding exists, when the student has demonstrated only procedural knowledge. Finally, once tracked into above level groups, it is very difficult to move a child into an on-grade as well as move an on-grade student into the above level group (because the gap between the two groups has widened significantly).

How does acceleration differ from enrichment?

When we accelerate, students move through one or more subject areas more quickly than in a standard school program. There must be a clear understanding that while we accelerate, we make sure that children have conceptual understanding before we move on. This is a beneficial consideration for below grade level students, as it moves them forward in meeting grade level expectations. When we enrich, students are using problem-solving and mathematical thinking connected to stimulating mathematical concepts. Conceptual understanding is widened. All students should experience enrichment to support improving understanding. When it is appropriate, use acceleration to the point where there is mastery of grade level expectations. Enrichment becomes more desirable to insure deep understanding of the concepts.

Communication

What do I say to parents?

This is a multi-faceted question but points to the issue of successfully keeping parents informed throughout.

Pre-implementation

As a school begins to move toward more heterogeneous grouping in math, parents need to understand why such a move is coming and how it will impact instruction. The staff in each school should be prepared to communicate how and why grouping decisions are made, using consistent and supportive language. This could be presented at Back to School Night, Open House, and/or PTA Meetings.

Implementation

Further into implementation, when it actually becomes real for their child, parents need to see how their child's needs are being met, how they are being challenged, and how the school is preparing their child for his/her future. This communication occurs in many forms and caution should be taken to recognize that much communication with the home occurs in indirect ways (homework, word-of-mouth, textbook use, etc.). This suggests that both direct and indirect communication must be well planned and focused on the short- and long-term benefits of this change.

Are you slowing down my child to meet the needs of the other children?

This is a critical question that schools/teachers must be prepared to answer. Discuss with parents the value in providing children with opportunities to work with diverse thinkers. Parents need to know that it is important for all children to first master the grade-level curriculum. In addition to this, children who show mastery will be enriched with differentiation strategies and will be flexibly grouped, as is done in language arts.

How does the 5th grade teacher recommend for middle school?

In communicating to the middle school, recommendation for placement is an aspect that is changing as FCPS has revised its curriculum to align with the VSC. Students do not need to have mastered the above grade curriculum in order to be placed in an honors class. The standards have risen and deep understanding of grade level indicators and the ability to communicate set a child up well for success in an honors program. This question is one that will in the fall of 2005 be addressed by a committee focused on articulation between elementary and middle school. (Audit Committee Recommendations 2005)

Assessment

How do I assess kids and make decisions about which group they belong in?

Assessment for grouping in a mixed-ability classroom must occur in an on-going way using both formal and informal assessments. Many grouping decisions can be made as a skill is introduced if children are given the opportunity to show what they know. But even these decisions are preliminary and must be adjusted as children demonstrate their understanding or lack thereof. Grouping decisions can be made using in-class work, quizzes, tests, journals, kid watching, exit card, conferencing, etc.

What do we do in terms of quarterly assessments?

Guidelines for the use of quarterly assessment are housed in the Examiner's Manual. The grade-level assessments can serve as both a measure of mastery of expectations, as well as set some guidelines for what the expectations are. But, some decisions must be made student-to-student. Quarterly assessments, along with other tools should assess whether a child has mastery.

Grading

How do we level kids on a report card?

It must be recognized that the report card is one form of communication (albeit a very limited form) and as such again must be planned for in light of the change. The report card indicates whether a child is working below, at, or above grade-level standards. In mixed-ability classrooms, the focus tends to be on grade-level standards or above. Therefore, most students will have an indication on the report card of "at grade-level". But, many children will spend significant amounts of time working on precursor skills and concepts. This requires the teacher to clarify the report card indication. The same is true for students being challenged beyond grade-level standards. The end-of-year report card also indicates level of mastery. This needs to be a true indication as determined through the multiple measures the teacher has used throughout the year. This indication mandates successful communication throughout the year so that parents are not surprised.

An example of what is explained above could be: Throughout the year, a third grade student is working on grade-level expectations, but has frequently needed support and reteaching to experience success. The child can be listed as being instructed "on grade level". At the end of the year, the report card is marked "not meet grade level standard", because mastery of all grade level curriculum and independence has not been met by this student.

Resources

Which book should my students use?

For most students, the grade level text will best serve as the resource for the work they do, but many students will need or benefit from assignments from the previous grade text or the subsequent grade text. For this reason, one suggestion would be to assign texts only as needed. This issue is an especially difficult one in the first year of grouping change after a child has already used a particular text. Be sure to communicate to parents how you will be using the textbooks.

What other instructional resources are available?

Along with the textbook as a resource, throughout the year, schools will be receiving both manipulatives and print resources for mathematics. The Problem Solver is an excellent resource for all children and is good for enrichment activities. The Great Source Handbooks (Math to Know, Math At Hand, Math to Learn, etc.) are also in all of the schools, and are content resources for teachers. The Frederick County Public Schools Math Item Bank at fcpssteach.org is another resource. The Gifted and Talented link on the fcpssteach.org website has ideas for Extension Menus, centers, etc., that are appropriate for all children.

Time

How do we find the classroom time to implement this model?

Time is critical to the success of more heterogeneous grouping because of the additional directed time for multiple groups. Thus 75 to 90 minutes of math daily is expected.

How do I plan for multiple LA and multiple math groups?

Start with the grade-level indicators and preassessments. Grade-level pre-assessments will tell you much about all of your students, even those students working above-level. Diagnose what your students need based on the pre-assessment. Take small steps. Use what you know about planning for language arts to help you start to plan for math groups. Find a planning partner and work together to create a workable plan for your math groups and to develop meaningful, respectful enrichment activities.

Leveling/Grouping

Are all of my students on grade?

Absolutely not. But that is not to suggest that we should not give all children access to grade-level expectations. Nor does this suggest that children shouldn't be challenged beyond the expectations. In order to be successful with all students, three criteria must be met. First, high expectations for rigor must be held – basically all students must have access to rigorous curricula and be expected to work toward and achieve those standards. Second, support must be provided to assist them in meeting the grade-level expectations. This will mean that for many children, the teacher must “back up” in order to move them toward the expectations. For some, enrichment beyond the expectation will be appropriate. And third, we must insist that all children learn and succeed. These are the three criteria held in high importance by Ruby Payne.

What role do math facts play in grouping?

The basic number combinations (math facts) are tools that assist in developing number and computation sense – the keys to mathematics development. Therefore, these number combinations are very important and should be an integral part of our program with the focus on building fluency with number. However, these basic number combinations should not be a limiting factor in how a child is grouped. Children who haven't yet developed automaticity with the combinations are still capable of developing high levels of math ability. We need to continue to provide a program that does both – works to assist students in acquiring the combinations as well as develops the more advanced skills of computation. The Fact Acquisition Resource (pp 1-11 on fcpsteach.org) will assist teachers with background on ways to develop number combinations to build fluency with number.

Planning

What does a differentiated lesson look like?

Differentiated lessons may take many forms and are similar in all curricular areas. Opening activities, like warm-up or calendar time may be done either whole group or in small group. Likewise, closing activities like summarizing, reflecting, and journaling may be done whole group. There is value in introducing a concept to the whole group. In teaching toward the expectations, this makes sense and can allow for the teacher to assess background knowledge prior to creating small groups. Significant time for direct instruction with each small group is important to the success of a differentiated lesson. Some days, groups will need less of the direct teacher time. A model like this will require independent time (while the other group is having direct instruction) and this will include true independent practice, exploration, enrichment, centers, problem solving tasks, etc. Many lesson formats will include time for the teacher to subsequently intervene with children needing more support (or those who can benefit from additional challenge from the teacher). All of these ideas are used with guided reading groups in an on-going manner and are similar with math groups.

How do I plan for a week and remain flexible?

Planning for a year, quarter, month, unit, week, and day have a single commonality. The plan serves as a guide, which must be modified based on the needs of the students and the diagnosis of the teacher. This means that the weekly plan should focus on the week's goal(s) and be backward-mapped. Planning should focus not only on the learnings, but also on key questions that will allow the teacher to focus on the lessons as well as diagnose throughout the week. This really requires giving students many opportunities to demonstrate/communicate their understanding. The planning tools on fcpsteach.org are helpful tools for planning with flexible grouping in mind.

How can I plan for multiple activities?

Care should be taken to avoid burnout as one moves toward differentiation. Start small. Just as you would do in other curricular areas, try a few new ideas and reflect on your successes and reevaluate to look for changes or additional needs. Teaching teams should look for ways to support each other – sharing activities and center ideas. Also, look to resources available to you in your text (most texts provide alternate activities for reteaching and enriching), on fcpsteach.org, and in your school's professional library.

How do I develop small flexible groups?

Pre-assess! Place students in instructional groups for specific skills, units of study or other learning opportunities based on readiness, interest, or learning profile. These grouping arrangements create temporary groups for an hour, a day, or even a week or month.

Do we have to have small groups everyday?

Although the answer to this is school-based, typically there are few "musts" in teaching. The answer goes back to purpose. Does every skill, every activity require small groups? No, but certainly discourse and thinking can be reinforced in small groups. Can we really find out what our students understand conceptually if we always instruct to the total group? Groups should be developed for a specific purpose and should be fluid/flexible. On-going assessment can help you in your decision-making regarding your small groups.

What do the children who are not with me do? And....**What are respectful activities (meaningful work) for children who are working independently?**

Students should be doing whatever they need to do to extend or reinforce their learning. This is one of the most challenging aspects of multiple groups. Children must develop the capacity to work apart from the teacher. This need not be work in isolation, but certainly requires a degree of independence. Strategies such as Choice Boards, Task Cards, Anchor Activities, Extension Menus, etc, can give students opportunities to work on tasks that are interesting, important, and engaging. Assigning a “student expert or study buddy” can help students to work through problems without the teacher’s immediate help. (See Differentiation Terminology document for explanation and examples of these) The activity may involve centers for exploration, games, or independent practice. The key is to provide a respectful activity, which challenges the student and supports his/her level of mastery.

What is appropriate for follow-up?

Follow-up can include a wide range of activities and certainly is dependent on the purpose. It may be designed to pre-teach or prepare students for subsequent learning (this includes backing up in order to develop component skills). It may assist with the development of a skill, which may involve exploration or invention with a manipulative. Follow-up may be reinforcement (independent practice) of an acquired skill or an activity that deepens (focusing on application and/or communication) or enrich the skill being addressed.

What are math centers? Where do they come from?

Centers can take many forms and serve many purposes. Regardless of the form or purpose, centers must support the student in either reinforcing or enriching their learning without being repetitive or mundane. Centers should provide children with directions for completion as well as all materials needed. It is best to introduce the center in a whole group setting so that the children can learn what is expected of them. Individuals, pairs, or even small groups may attend centers. Centers focus on a few different activities centered on a concept or may be used to reinforce previously learned concepts. Center ideas can be found in many places, from a page in a resource, to on-line activities, to teacher-created games, to activities from a textbook. Centers can be problem-solving tasks and can include written explanations or discussion in pairs. Sharing center ideas with colleagues is a good idea. Ideas for management of centers might include Choice Boards, Audit Cards, or other visual organizational techniques. (See Differentiation Terminology for explanation and examples)

What about grading all of these centers?

Remember the purpose of centers. They are to reinforce or enrich students’ learning. Centers may be graded if the teacher would like to use the activities to help diagnose a student’s learning. From time to time, kid watching during center time would be an appropriate way to diagnose. A more effective way to diagnose is through small group instruction, journal writings, or dialogue with the student. A formal grade may not be needed for center activities. Perhaps periodic annotations of what the child has accomplished in centers or an Audit Card, or a weekly conference would suffice.

What do I do with early finishers?

The easiest answer to this is to make sure you provide a least some activities that are open-ended and will, by nature, not be completed or will take extensive time to complete. The use of an Anchor Activity, or a long or short-term project would be appropriate here. Another alternative is to provide a set of expected problems solving activities or tasks with additional ones as time permits. Other approaches are to provide centers that can be done either independently or in pairs. One caution is that independent time should not be too long – expecting children to work independently for long periods of time is unreasonable. The length of time is both dependent on the amount of time needed for direct instruction as well as the degree of independence that has been established.

Is homework differentiated?

Differentiation can occur in all aspects of instruction and need not only focus on ability. Homework should be developed to meet the diverse needs of students based on the child's strengths and weaknesses, but may also be differentiated in response to culture, gender, and interest. The purpose of homework can be differentiated. Instead of using homework for the purpose of independent practice, it can also be an opportunity for data collection, to apply math to "outside school" life, research, to involve parents, extend skills, and provide problems outside the scope of the curriculum.

Management

How do I manage multiple groups?

As in language arts and the other curricular areas, management of a flexibly grouped math class must be planned for. We want children to be successful. They must be trained in a differentiated structure, in routine, and in expectations. These kinds of things must be practiced and the teacher must recognize that they take time to develop. Allowing students to move from area to area during math class must be taught early in the year. Time must be taken as part of instruction to “teach” children how to adapt to working in a differentiated classroom. They must learn to whom they might turn and other means for addressing the problems they face. Routines will assist children in accommodating the behaviors expected, but times like transition to and from group must also be planned for – these are times when inappropriate behaviors can occur. Materials management is also important. First, students must learn how they will be receiving the materials needed. Second, they need to understand the appropriate use of the tools that will be used. These “rules” must be developed in whole group prior to expecting children to follow them when working independently. As a group is directed toward their independent activity, the teacher needs to explain the activity. This means time when the directed group is not yet functioning. Consider providing the directed group with a short “gap” activity (preferably something related to the concept to be addressed). For example, a teacher might ask the students in one group to pair up and orally count by tens starting with 3, while directions are given to another group. Chapter 6 of How to Differentiate Instruction in Mixed Ability Groups by Carol Ann Tomlinson has ideas for getting started with multiple groups. All of the schools have her books. Ask your administrator. One last point, children are not innately programmed with an “independence gene” nor have many children developed this ability. Therefore, the teacher should recognize that this is an acquired skill and may take a significant amount of time to develop.

Differentiation and Grouping in Mathematics

Bibliography

- Braddock, J.H. & Slavin, R. (1992). Why ability grouping must end: Achieving Excellence and equality in American Education. *Paper presented at the Common Destiny Conference, September 9-11, 1992.*
- George, P. (1993). Tracking and Ability Grouping in the Middle School: Ten Tentative Truths. *Middle School Journal, 24*, pp. 17-24.
- National Council of Teachers of Mathematics, (2000). Principles and Standards for School Mathematics.
- Tomlinson, C. (1999). The Differentiated Classroom: Responding to the needs of all Learners.
- Tomlinson, C (2000). How to Differentiate Instruction in Mixed-Ability Classrooms, ASCD.
- Adams, Cheryll, and Pierce, Rebecca. (Spring, 2004) Tiered Lessons. *Gifted Child Today Magazine, 27*, Issue 2, pp.58-66.
- Eisenhower Regional Consortium for Math and Science, EdThoughts: What we know about Mathematics Teaching and Learning. (2002) 2-5
- Hill, Denise. The Mathematics Pathway for All Children. *Teaching Children Mathematics.* (2004). 127-133.
- Wheelock, Anne. (1992). Crossing the Tracks: How Untracking Can Save America's Schools. Does Ability Grouping Help or Hurt?
- <http://www.fcpsteach.net> - Go to link for *Elementary Mathematics* and for *Gifted and Talented Education.*
- Educational Research Service. 1998. *Ability Grouping: Effects and Alternatives.* 1-8.
- Davis, Gary A and Rimm, Sylvia B. Education of the Gifted and Talented Third Edition. Acceleration. p.103-107.
- Corbett Burriss, Carol, Heubert, Jay, and Levin, Henry. Math Acceleration for All Educational Leadership. 2004. p. 68-71.
- Spear, Robert; "Teacher Perceptions of Ability Grouping Practices in Middle Level School." *Research in Middle Level Education* 18 (1994): 117-30.