

Teaching Math in the Multigrade Classroom

BY HELENE HUBBARD

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Ask several teachers the goals of mathematics instruction and they will probably say something like this: "To enable students to solve problems in real life and to prepare them for further mathematics education." Ask what keeps them from achieving these goals, and they will usually say "not enough time to help my students." They know what needs to be done, but often lack the time and resources to do it.

The best thing about a one-room school or multigrade class is having so many teachers in one place! Every child is a teacher of the younger pupils, and a student of the older children. Many single-grade classes use some peer tutoring, but with numerous difficulties: same-age children have a rather narrow range of achievement compared to cross-age groups: same-age tutoring often means that brighter learners try to teach slower children. So certain ones are always doing the giving, while others are always receiving instruction. A multigrade class has a wide range of achievement, so there is usually a "teacher" available who has mastered any topic a child needs to learn. As students come to a new topic, they can find someone who has mastered that topic to explain it to

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them. When a child masters the topic, he or she becomes the “teacher” for the next child who comes to it (under the supervision of the classroom teacher, of course).

It is much easier to individualize math instruction in a multi-grade classroom and to combine acceleration, enrichment, and/or remediation as needed for each child. In a single-grade group, there are practical problems in offering more than three levels of instruction—(1) obtaining enough different texts and test materials, (2) not stepping on the toes of next year’s teacher who wants to teach all pupils the same page at the same time, (3) finding time to help so many students, and (4) preventing children from making negative comparisons with those who are ahead of or behind the majority. In the one-room school, this year’s teacher is also probably next year’s teacher, so each learner can progress uninterrupted. Textbooks are usually available at all levels from 1-8, along with previous textbooks to supplement the current set. Students in a multigrade classroom usually accept the idea that each child can be at a different place in the curriculum and have differing assignments and activities.

A multigrade class also offers endless opportunity for preview and review. As students watch older pupils study new topics or listen in as younger ones do old topics, the concepts are reinforced in their minds. As students observe or are included in teacher presentations to different groups, the materials are re-taught without embarrassment or boredom.

Finally, the opportunities for problem-solving and use of computers and manipulatives are increased because there are fewer children at each level. The cost of Cuisenaire rods for a class of 30 students may be prohibitive. Fewer sets are needed in a multigrade class because the children use the materials at

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different times. The teacher can permit more kinds of class activities, such as calculating the area and volume of garden materials needed to redo the flower beds, or comparing prices and traveling to the pet store to purchase classroom mascots—because these activities are cheaper and easier to arrange for fewer students.

In a single-grade classroom the ratio of children to computers is generally high. One-room schools, as a rule, have fewer students per computer, so each child can spend more time at the keyboard.

What are the challenges of teaching math in a multigrade classroom? The teacher must be flexible, willing to con-

tinue to learn, and able to delegate and supervise effectively. He or she must be flexible enough to individualize and use hands-on methods. The teacher must be willing to adapt topics for students ranging from a slow first grader to a gifted eighth grader. He or she must feel secure enough to delegate responsibility and supervise tutoring.

How to Do It

Multigrade math takes an hour a day to do properly. Organizationally, it is easier if all students do math at the same time, but it isn’t essential to the success of the program.

Most teachers like to start with drill for five minutes or so. Drill sheets can be made at the beginning of the year, covering the range from addition and subtraction facts and times tables to a few examples each of the fractions and percents. Once made, the sheets can be repeated for all students throughout the year. (Twenty sheets will keep the repetition down to once a month.) The goal is to see how many problems students can answer correctly in the allotted time, so each child competes against his or her own best score. By looking at the pattern of errors, the teacher can easily see where students need help.

Use the main period of about 50 minutes for individual and group instruction. At the beginning of the year, have each student take a criterion-referenced test, such as the end-of-book test for the previous year’s work, in order to highlight any deficiencies. Any student scoring less than 90 percent on the previous year’s test should receive review and remediation before beginning the new book.

First graders and average or slow learners should then start through their texts. Use a combination of approaches for these students. Traditionally, the teacher presents the lesson, gives instructions, and then assigns student

work. However, this method may foster dependence on the teacher if it is the main approach. Older students can present most concepts, or the instructions can be given on cassette tape or by a tutor. Later in the year, younger pupils can read or figure out the instructions for themselves.

Tutors

It has often been said that the best way to learn something is to teach it. Every student who has mastered a topic can be responsible to teach it to the next student who comes to the topic. The benefit to the student as learner is obvious; the benefit as teacher is even greater. Every student who is current on his or her work is also eligible to tutor younger students for part of the math period.

Keep in mind several things when making these assignments: Less-able students gain self-esteem as well as valuable reinforcement from tutoring; gifted students need less review but benefit socially and spiritually from helping others; students who are advancing rapidly should spend less time tutoring because they are in a rapid growth phase, while those who are at a plateau in their achievement can consolidate their learning by tutoring.

Although students don't need formal instruction to become tutors, you will need to ensure that children work positively together, that tutoring does not interfere with the tutor's progress, and that learners avoid over-dependence on tutors.

Routine Lessons

Have older students begin a routine lesson by studying the examples and explanation at the top of the page and asking their tutors questions about the concept. Next, have the students work a few problems and check them at the checking table. (First graders or slow learners may need a tutor to help them check their work.) If the students are

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doing the problems correctly, they can continue.

After they complete their assignment, have them check their work. If they score 90 percent or higher, they can go on to the next lesson. If not, they should get help from a tutor. For students still experiencing difficulty, you will need to provide individualized help, remedial activities, a group presentation on the subject, or other assistance.

Introducing Important or Difficult Topics

Some lessons may be especially difficult or important. You should make the initial presentation on these topics. Try scheduling a group session with the students who have come to that topic, students who need review, and those who will soon reach the topic. Or you can individualize the lesson for a particular learner. Following the presentation, have the students proceed as with a routine lesson.

When students complete a topic, collect the end-of-chapter test and grade it. If they get 90 percent or above, they are ready for the next chapter and become the new teachers of the topic they just mastered. If they score below 90 percent, assign remedial activities and reteach difficult areas. Remediation should utilize as many sensory experiences as possible and emphasize manipulatives to accommodate the concrete thinking of elementary students. Follow-up should include problem solving,

real-life applications, and frequent retesting to maintain mastery.

During the last five minutes of the math period, have the pupils show you their corrected work for that day. Place a star on the chart for each child who has completed the day's assignment. Incomplete work becomes homework for that night. Any student who falls behind tem-

porarily loses the privilege of being a tutor unless the experience seems vital to the child's self-esteem or learning.

Gifted Learners

Gifted students should not do every page in every chapter of the book. It actually impedes their progress to do so. Instead, have them take the end-of-chapter test first. They should then do only the pages with the concepts they haven't mastered. Gifted students should also have challenging enrichment activities. After a suitable training period, average learners may profit from this diagnostic-prescriptive approach as well.

It is much easier and more efficient to individualize math than to try to keep the better students occupied while slower students struggle through lock-step lessons that don't meet anyone's needs. You will prepare students for future math education by having them work at their own pace and instructional level while they receive multiple exposures to the topics. Finally, students will master practical problem-solving more easily if they have a wide variety of experiences and opportunities—which are easier to provide in multigrade math classes. ✍

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