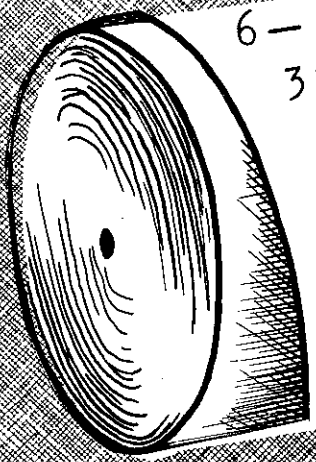

$6 - 4 + 16$

$3 \times 12 \div 7$

621322

1234567

$16 - 3\sqrt{144}$

$\sqrt{124792}$

$\frac{x}{5} \cdot \frac{6}{3} \div \frac{4}{12} - \frac{16}{7}$

TEACHER MATHEMATICS

7654321

51322

$144 \times 10 - 16$

12345678

$16 + 3\sqrt{144}$

$X \times A - B + C = \_\_$

$5 - 3 + 12 - 17$

$144 \times 10 - 16$

4367×10

$4 \times 37 - 4 + 7$

$345 - 43\frac{1}{2}$

$6 - 4 - 16$

$16 + 3144$

$7893 2 \times 145$

$560.11T$

$4 - (5 \times 3)$

TEXAS MATHEMATICS TEACHER is the official journal of the Texas Council of Teachers of Mathematics. The views expressed are the contributor's own and are not necessarily those of the publisher or the editor. All manuscripts and correspondence about this publication should be addressed to Mr. J. William Brown, *Texas Mathematics Teacher*, 100 So. Glasgow Drive, Dallas, Texas 75214.

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TEXAS MATHEMATICS TEACHER

Texas Council of Teachers of Mathematics

Vol. XXIX October, 1982 No. 4

PRESIDENT'S MESSAGE

Again TCTM's part in sponsoring CAMT, Conference for the Advancement of Mathematics Teaching, will be on site registration, November 11–13, 1982.

I am requesting all members who are attending to stop by the registration desk and donate an hour or two to assist the regular workers.

This is my last president's message, and I wish to thank all of you for making my term of office a pleasant one. During her term as president–elect, Betty Travis assisted me in many ways, and I hope that I will be able to do the same for her next year. Please give your support to the new executive committee by recruiting new members, contributing articles to the Newsletter and the Journal, and attending CAMT, Name–of–Site meetings, and the annual meeting of the National Council of Teachers of Mathematics.

Look for Student Merit Award Program books, one for middle school and one for high school, to be published this fall by the National Council of Teachers of Mathematics. TCTM was one of the five affiliated groups to be chosen by NCTM to participate in the development of this project. More writers from TCTM had material accepted for publication than any other group. These enrichment materials will be helpful to any mathematics teacher.

Thank you again for your support and cooperation during my term of office.

Sincerely,

Patsy Johnston

Texas Council of Teachers of Mathematics General Meeting

On Friday, November 12, 1982, during the annual CAMT meeting in Austin, there will be a general meeting of the Texas Council of Teachers of Mathematics. The Executive Committee urges each and every TCTM member, as well as all prospective members, to attend this meeting. Come and meet the newly elected officers along with all members of the Executive Committee and representatives from the National Council of Teachers of Mathematics.

Your ideas and suggestion for building a better TCTM are needed and requested. TCTM can only be as strong as the membership involvement, and support of mathematics teachers make it.

See you there!

MANUSCRIPTS NEEDED!!!!! Send them to 100 S. Glasgow, Dallas, Texas, 75214.

WANTED: A MATHEMATICS EDUCATION SPECIALIZATION FOR ELEMENTARY SCHOOL TEACHERS IN TEXAS

DR. BOB BLOMSTEDT
DR. GEORGE ALEXANDER
TEXAS A & I UNIVERSITY

The writer of the Book of Ecclesiastes in the Bible has stated that for every thing under the sun there is a time and a reason. The time and season for the exploration of possibilities for the development of a specialization in mathematics education for prospective elementary teachers for Texas schools has arrived. It has long been evident to those professional educators involved in teacher training programs who are knowledgeable of needs related to the teaching of mathematics that a serious problem has existed at the elementary school level. Since the advent of Sputnik and the ensuing quest for improved programs in mathematics, colleges and universities have been lagging in the thrust to implement sufficient training in mathematics for prospective elementary teachers in relation to goals established by the Committee on Undergraduate Program in Mathematics (CUPM), the National Council of Teachers of Mathematics (NCTM), and other National groups. It is a known fact that in some institutions in Texas teachers may still be certified for teaching in the elementary school without having completed a single college course in mathematics.

Continuing pressure from the public and from legislators because of apparent poor student performance in mathematics has recently generated significant publicity at both state and national levels regarding concerns both present and futuristic. These concerns center both on the number of mathematics teachers available and on the quality of instruction generated. It is now the proper time for exploring solutions to these serious problems. It is the proper time to explore seriously the possibility of initiating a new specialization in mathematics education rather than "pure" mathematics. If the purpose of the Texas Education Agency and higher education in Texas is to significantly influence what transpires in the public schools of Texas, the concept of such a specialization cannot be ignored.

The first major argument against a proposal for a specialization in mathematics education appears to be that mathematics education is not a subject but rather methods oriented and contradicts the thesis that all specializations should be subject oriented. Such an argument may be true in theory, but not in fact since the mold has already been broken and the precedent established when bilingual education was approved as a specialization for Texas teachers. Both bilingual education and mathematics education deal with a composite mixture of subject material and methodology and each is geared to meet the needs of a specific set of learners and a set of specialized teachers. Mathematics educators need to begin now to promote and lobby for the benefit of the school children of Texas in the light of existing conditions. Consider the following statistics:

1. Of 43 students at Texas A&I University making degree plans in elementary education in the past 3 years, only 5.8% had a specialization in "pure" mathematics.
2. When junior and senior elementary education majors who enrolled in the professional education course entitled Teaching ARithmetic in the Elementary School were tested on basic arithmetic computational skills including the four basic operations on whole numbers, decimals, fractions, and elementary percentages, approximately 50% scored below seventy and a significant number scored below 50.
3. At an inservice workshop, when a group of 30 certified elementary teachers who were currently employed in ten different school districts were tested in basic skills computation, more than 50% scored below seventy.

As disheartening as these statistics are, they are mild when compared to performance on verbal problems lifted from 5th and 6th grade elementary school mathematics text books. A set of 20 such problems (see appendix) lifted from textbooks in adaption since 1963, was recently administered to 30 graduate students with undergraduate degrees from 10 different universities in Texas who are currently employed at the elementary, junior high, and high school levels. When scores were tabulated it was found that the scores ranged from 20 to 95 with over 65% scoring below seventy. In addition, when 12 doctoral students were tested on the same verbal problems, more than 60% scored below 70.

These statistics are generally complemented by very negative attitudes toward arithmetic and by what appears to be a "Mathematics fear syndrome" that is probably seriously affecting the quality of instruction in Texas elementary schools. This problem was recently addressed in an article by Anne Tishler appearing in the Capstone Journal of Education. The author in the article entitled "Attitude Achievement Interaction in Mathematics With Preservice Elementary Teachers" speaks of the high level of the phenomenon of "math anxiety" that is prevalent among elementary teachers with the accompanying achievement lags resulting from poor expectations and poor teaching performance.

The "math anxiety" syndrome is very real and specialization programs in "pure" mathematics for elementary teachers seem to add to the syndrome. A well planned sequence of courses that incorporates elementary mathematics, basic arithmetic, teaching methodology, diagnosis and prescription, and readings in mathematics education for attitude development seems to be a more suitable approach for educating at least a portion of the elementary classroom teachers to do a more suitable job in preparing students to meet the challenges of secondary and higher education courses.

Some school districts are now offering to pay the tuition for teachers to go back to college and complete a specialization in mathematics. Success of these programs has been severely limited. A mathematics education specialization, however, should have a much greater potential for reaching increasingly greater numbers of students.

We can no longer afford to leave this specialization "stone" unturned. The need is urgent. A concerted effort is needed from Texas Mathematics Educators across the state.

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NOTE:

Dr. Blomstedt is an Associate Professor of Eduction at Texas A&I University in Kingsville.
Dr. Alexander is an Associate Professor of Education at Texas A&I University and certification officer for the College of Teacher Education.

APPENDIX

1. A Parallelogram has a perimeter of 28 inches. Find the lenth of each side if one side is 10 inches.

2. A rug is 9 feet wide and 15 feet long. What is the area of the rug in sq. ft.? What is the cost of the rug if the price is $8.95 a square yard?

3. A room has the shape and measurements shown below. Find the total area of the room in square feet.

4. In 1963, astronaut Gordon Cooper completed about 22.9 true orbits about the earth in his Faith 7 space capsule. Each orbit took 88.45 minutes to complete. Cooper blasted off at 6:04 A.M., and was in orbit at 6:10 A.M. Assuming his elevation above earth to be 100 miles at 6:10 A.M., what was his average speed in climb in miles per hour?

5. A satellite is put into orbit. It makes a total of 867 orbits. It makes 9 orbits each day. The satellite travels at a rate of 5 miles per second. How many miles does it travel per hour? How many miles does it travel per day?

6. At take off, the ground temperature was 45 degrees above freezing. At 40,000 feet the temperature was 55 degrees below freezing. How many degrees colder was it at 40,000 feet than on the ground?

7. If a football team had gains and losses of +4, +5, -7, and +2, what was its total gain for the four plays?

8. Jane's mother bought a roast costing $3.89 in the meat department. The meat cost $ .89 per pound. The roast weighed 4 pounds and about how many ounces?

9. To make one bowl of punch for a party we used 3 quarts of ginger ale, 1 pint of tea, and 5 pints of fruit punch. How many pints of punch would be in two full bowls?

10. Judy's father drove Judy and her bicycle 4.3 miles. Judy then rode her bicycle 2.4 more miles, then turned around and rode home. If the cyclometer read 72.8 miles at the start of the trip, what did it read when she arrived at home?

11. What is the total cost of 5 train tickets at $6.58 each and 5 meal tickets at $2.75 each?

12. During an average day in 1962 about 30,000 cups of coffee were drunk at the Pentagon. If a pound of coffee costs 69¢ and made 50 cups of coffee, how much would it have cost one person to supply all the coffee for one day?

13. Ralph gave the bus driver a dollar bill to get change to pay his fare. He got back two quarters, three dimes, and four nickels in change. Ralph put a quarter and a nickel in the fare box. Then he dropped one of the other coins. When he counted up the coins he still had, there was 60¢. What coin did he drop?

14. If 1/2 of the children in the 5th grade are boys and 1/4 of the boys are left-handed, what part of the 5th graders are left-handed boys?

15. There are 120 people in a room. One-third of the people are blondes, 1/4 of the people are redheads, and 1/6 of the people are gray haired. IF all the people left are brunettes, how many brunettes are there?

16. A fifth grade class bought 1 3/4 pounds of fudge, 2 7/8 pounds of caramels, and 1 7/12 pounds of jelly beans for a class party. After the party was over John weighed the candy that was left over. He found there was 1 7/8 pounds left. How much candy had been eaten?

17. A captain wants his ship to go 2236 miles in 3 days and 14 hours. How fast should he plan to travel?

18. Gear A in a machine turns 16 times while gear B turns 3 times. How many times will gear B turn while gear A turns 80 times?

19. A farmer said that he intended to sell 75% of his cattle. He is going to keep only 12 cows. How many cattle will he sell?

20. John found that 90% of his basketball shots hit the backboard. Twnety-five percent of his shots went through the basket. If 2 of his shots missed the backboard, how many baskets did he make?

HOW TO USE THE NEWSPAPER IN MATHEMATICS CLASS

BY
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Every mathematics teacher who teaches decimals and percent is familiar with real life applications based upon examples from the daily newspaper. Facsimilies of discount advertisements, sale announcements, and grocery store ads can be found in every textbook providing supposedly real-life applications of operations with decimals and per cent. However, students recognize that while the textbook problems may arise from a realistic situation, the prices and percentages that they see in the daily newspaper. So children dutifully compute answers to these problems which are really no different than all the other "story" problems in the textbook despite the picture of an advertisement proclaiming car loans at 6% interest.

Obviously, solving problems based on numbers from actual newspaper advertisements and articles would generate more interest and enthusiasm from students than problems in textbooks. Numbers from articles on sporting events can provide high interest mathematics activities involving whole number operations as can reports on temperatures, river levels, and other data on the weather page. Teachers in language arts, social studies, and science all use newspaper activities to maintain student interest and show how these subjects relate to daily events. Research in language arts curriculum has shown that attitudes and achievement for boys and girls can be improved when daily newspapers are used as the source for assignments. Whey then don't more teachers use the newspaper to increase student interest and motivation in mathematics? As will be discussed below, there are a few legitimate reasons, unique to mathematics, which help explain why newspapers are not used more to provide problems in arithmetic and mathematics. However, it is possible to plan mathematics activities which overcome most of the major problems in using daily newspapers. Examples of these activities will be presented along with suggestions for extending the activity in other areas.

Problems and Activities in Using Newspapers

1. The numbers used in newspaper articles are so varied that problems which fit a particular skill level cannot be easily found. For example, practice on only one- and two-digit subtraction problems is appropriate, yet turning to the sports pages for ideas yields some three-digit examples in the scores of games played that day. One place to look for two-digit data for subtraction problems is the weather page which lists daily maximum and minimum temperatures for cities around the state, country, or world. The following activity would be appropriate in both the fall and spring in Texas.
   a. Find the temperature chart in the weather section of the newspaper.
   b. For each city (or however many you want) find the difference between the maximum and minimum temperatures. List the city, maximum and minimum temperature, and difference in a chart as shown below.

City	Maximum	Minimum	Difference

This activity is good for helping elementary students order two-digit numbers and to understand how location within the state or country affects temperature. It is especially interesting to do this for cities in the southern hemisphere during our winter months.

2. All the problems will have different answers and it is next-to-impossible to check each student's answers. One way to solve this problem is to have a hand-hald calculator available for students to check their answers after completing the activity, particularly with decimals and whole numbers. The calculator is great for motivating students to work several problems simply so they can check each answer. Another solution is to have students work in pairs so they can check each other' work. In some cases, it is possible to use part of the information in the newspaper article or chart to check computation. For example, students can practice subtraction of fractions by using the high and low values for given stocks and check it against the net change listed in the stock market report. Net change in river stages from one day to the next can also be verified by subtracting decimals/whole numbers from the daily river reports found on the weather page.
3. Problems for multiplication/division from the newspaper always involve decimal numbers OR students need to know all their multiplication tables to use newspaper examples.

   While it is true that many division and multiplication problems can come from ads with 2 for a price or 4 tires for ?X, some interesting examples using whole number division can be found on the sports pages. For example, division by 7s, 6s, and 3s can be practiced by the following activity:
   a. Find several stories about football games showing the final score for each team.
   b. Write the name of each team and its total score in the chart below. Divide the point total by 3 to see if that score is possible if only 3-point field goals were scored.

      Divide the total score by 7 to see if that score could be attained by only 7-point touchdowns. Repeat for 6-point touchdowns. Ex.:

Team	Points	Only 3-pt FGs	Only 7-pt TDs	Only 6-pt TDs
Blue	18	Yes (6)	No (2 4/7)	Yes (3)

      Read the story and write an addition problem to reflect how the teams actually scored points.

   Another activity using multiplication by 4 involves golf scores, found in the spring sports section.
   a. Find a story about a golf tournament (usually in Monday's sports section).
   b. Write the daily scores for the top ten golfers in the table.
   c. Find the lowest single round score for each golfer.

Name	Round 1	Round 2	Round 3	Round 4	Lowest Round	Lowest Score Total (4 above)

Whole number multiplication can also be practiced by taking

football yards rushing/passing per game and multiplying by the remaining games in the season to see if various rushing/passing records will be broken. This is a good week-by-week activity to keep track of various athletes' progress (or lack of progress).

4. Only computation examples can be found in newspapers. Despite the preponderance of newspaper activities involving computation with decimals, per cent and whole numbers, it is possible to plan activities in comparing and graphing numbers, telling time, and finding perimeter and area.

   The daily stockmarket sales volume is a good source for large numbers to be compared or written in words. Graphing on a number line can be done with numbers from river changes and stock market changes.

   Temperatures in several cities can be located on a number line graph to help students in ordering two-digit numbers. Obviously, day-to-day temperature changes can be represented by a line or bar graph done from Monday to Friday, as can stock fluctuations.

   Telling time using a conventional clock can be done using a television time schedule (hours and half-hours) or movies (to the minute) by having students fill in the hands on a series of clock faces with numerals, labeling each clock with the movie or program starting time shown. Perimeter and area problems can be generated from oriental rug advertisements and real estate advertisements showing floor plans for homes and condominiums.

5. Problem-solving skills are not used in newspaper activities. It is quite easy to plan activities using the newspaper which call for higher order problem-solving skills. For example, you can put together a simple two-step problem asking which oriental rug (if any) will fit in which room(s) of a given floor plan shown in a real estate ad. Price comparisons involving cars, boats, loans, tires, and other items are possible. More complex problems involving computing the costs of carpeting/furnishing an apartment or home are anything but routine problem-solving activities.

   There is one skill in decimals that students often need to practice because it frequently appears on tests to check for understanding of decimals and whole numbers. The problem is subtracting a decimal from a whole number, e.g., 6 - .4. This newspaper activity uses the river forecast from the weather page.

   a. Use the information from the river forecast on the weather page of your newspaper to complete the following chart. Use at least five cities and/or rivers.

River	City	Flood Stage (ft.)	Reported Stage (ft.)	How Far From Flood Stage?

   Since the flood stage is reported as a whole number, and the reported stage is usually reported to the nearer tenth, the subtraction involves thinking about how to line up the numbers. It also helps to have a real-life example which motivates the subtraction problem.

Some Management Suggestions

1. Set aside an area of the room for a Newscenter as one of your learning center activities. Have the current newspaper(s), scissors, stapler, and folders available.
2. Let students choose activities from a file of possible activities on a specific skill OR you can assign specific activities in their folder each week.
3. Have students cut out the newspaper article or activity and staple it to the worksheet. You can then review their work in their folder and randomly check selected activities.
4. Do use the current newspaper. Students are more motivated to read today's news.
5. Arrange for a mathematics in the newspaper bulletin board for students to demonstrate their math skills through applications to daily real life situations.
6. Encourage students to add to previously worked sheets when they find something interesting to them. This practice furnishes the reinforcement needed to ensure maintenance of skills.
7. Scan the newspaper before making specific assignments. Keep a file on which sports are good for specific skills as noted in the activities above, or which seasons are good for certain weather activities.
8. Be sure that students know and can communicate that they are working on mathematics objectives and skills by using the newspaper. Keep their folder to show parents specific skills that are being worked on as a supplement to the regular mathematics curriculum.
9. Do design your own activities for using the newspaper, identifying each by the skill needed to complete it.
10. Check with your local newspaper regarding special rates for multiple copies delivered to schools if you decide to do a whole class activity using one or more activities.

Mathematics is very frequently viewed as something that is unrelated to other school subjects and also unrelated to real-life situations. Using the newspaper as a source of real-life problems involving all aspects of mathematics is one way to help students understand the importance of mathematics in their lives. Further, using the newspaper to find specific data for mathematics forces them to read with comprehension about numbers and quantity, a skill that is becoming increasingly important in our technologically-oriented society.

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ORGANIZING AND IMPLEMENTING AN ACTIVE APPROACH FOR LEARNING MATHEMATICS

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The Rationale

Children need a mathematics program that is both stimulating and responsive to the social, emotional and intellectual needs of the individual. If teachers are sensitive to these needs they will tailor their mathematics program to the natural learning characteristics of children. Learners (that includes all of us) prefer an approach to learning mathematics that offers a variety of instructional strategies, activities and materials.

I recognize that teachers are obligated by school boards, administrators, parents, and professional standards to provide the basic mathematical concepts, computational skills, and problem solving skills that are necessary for children to function as our future decision makers. Can an active approach for learning mathematics meet the child's natural learning characteristics to maximize the learning of mathematics? A child's intellectual growth and society's desire for children who are competent in mathematics don't have to be in conflict. I believe that teachers can reconcile society's desires and children' s needs through an active approach to learning mathematics.

An Active Learning Philosophy

An active approach to the teaching and learning of mathematics places an emphasis on the process of learning mathematics while simultaneously incorporating an adequate supply of skill applications through problem solving activities. A basic mathematics program utilizes manipulative models as the foundation for a sound program for learning mathematics. Children can learn and abstract mathematics from their models when they are allowed to work in various organizational settings for promoting the use of the models, collecting data, and recording their observations about mathematical relationships. When a teacher adopts an active approach for learning mathematics they may want to provide a variety of materials to facilitate their program's goals (e.g., manipulative models; filmstrips, cassette tapes; computers; and games).

Levels of Representation (Thinking) for Learning Mathematics

A basic premise of mathematics teaching is that a learner should model (by manipulating and thinking about the model) a mathematics concept to be learned. Usually, as a result of using mathematics models, the learner passes through thinking stages or levels of representation when cognitively processing the concept that is being learned. Bruner states that children learning mathematics process lerning through these representational levels of thinking: concrete (manipulating models), pictorial (imaging models), and symbolic (using abstract verbal codes). Therefore, it would appear unreasonable to expect that all children should be symbolic learners (via the textbook only approach) of mathematics before they have had an opportunity to actively engage in learning with mathematics models at the concrete and pictorial levels. This implies that the teacher may teach mathematics to a child who has not reached the symbolic representational level for processing mathematics.

The most successful teaching strategy for the non-symbolic child in learning mathematics is through an active approach to learning mathematics. that utilizes concrete and pictorial models. In an active math program, manipulative materials should be provided both as an inital device for promoting a mathematics concept as well as a reinforcing device while a child applies a concept or skill in a follow-up activity. After a child grasps a concept concretely, he or she will normally ascend (assuming you have provided the appropriate mathematics learning environment) to the next level of conceptual representation. You must be patient! Children don't become symbolic learners of mathematics just because you think they have had enough prior experience with manipulative materials. Remember, when children no longer need manipulative models they will put them away.

The Organization and Management of the Program

A teacher who adopts an active mathematics program philosophy must first establish the instructional goals and then compile a plan for effectively attaining those goals. Effective management of an active mathematics program is necessary to achieve full utilization of both the human and physical resources available for children. In many "individualized" programs children are asked to work independently, but with little or no teaching before independent work is assigned. When learning new math concepts or skills, children should be formally instructed (this does not imply that a lecture or symbolic teaching is appropriate) with appropriate models or aids before you ask the class to be independent learners in applying and developing that concept or skill.

In a mathematics classroom, children should be introduced to a mathematical topic through large group instruction. New or previously taught mathematics content needs to be developed in activity groups. These are the appropriate places for children to be independent learners. These activity areas could be labeled: listening station, folders, media center and games. Children rotate in small groups (4-8 children) through these 4 activity areas until they have participated in all four activities. The cycle starts at A and ends with D (see diagram of schedule).

	GROUP 1	GROUP 2	GROUP 3	GROUP 4
A	Listening Station	Folder	Media Center	Games
B	Folder	Media Center	Games	Listening Station
C	Media Center	Games	Listening Station	Folder
D	Games	Listening Station	Folder	Media Center

The schedule rotation may take more than one day to complete. IF you focus on a mathematical topic as a unit of instruction, it may take from one to three weeks to successfully accomplish your instructional objectives within the structure of activity areas or centers.

Media, Manipulatives, Games and Folders

The listening station can be utilized with teacher or commerically produced audio-visual materials for reinforcing math concepts and/or skills that have been previously introduced by the teacher in a large group instructional setting. The folder area is where a child stores his/her paper and pencil type material for recording observatons from math activities, activity/task worksheets, and math experience

stories. The actual items in a folder may include: a math textbook, instructional units designed by the teacher, aupplementary math workbooks and worksheets, paper for writing math experience stories, etc. The children use concrete and pictorial models in solving problems during their folder activity. THey then record their results and place the paperwork in their folder. The media center could use individually operated filmstrip viewers and tape players, microcomputers, and other enrichment, remedial or extended activities. The game area incorporates various levels of games to reinforce basic math skills that have been previously modeled and conceptually developed.

The use of the listening station enhances the child' s ability ot learn through a different instructional mode. The listening station should have a variety of program formats utilizing filmstrips and cassette tapes. The software content needs to provide a wide variety of concept development review, drill and practice, and problem solving skills. The children may also use these same programs for individual development and reinforcement at the media center.

Manipulative materials must be easily accessible throughout the classroom so they may be readily used by the children. Children should be encouraged to use a wide variety of manipulatives for modelling math concepts and skills. Some of the materials that need to be made available are: cubes, beads, chips, numeration blocks and balances. Children can model and validate mathematical relationships shen they use manipulatives. These materials must be used frequently in an active approach for teaching and learning mathematics.

The use of a folder is necessary for helping children to be organized when working on activities that require pencil/paper work. Some of this work may be from textbooks, activity assignments, task cards, teacher designed materials, or supplementary worksheet material. At other times the children could be given work that is not part of the current unit of instruction, but that provides additional experience in areas that have been previously taught, but not sufficiently mastered (at some level of representation) by individual children or the entire class. The key element is to provide a variety of formats (e.g., active problem solving, audio-visual materials, games, and pencil/paper tasks) for problem solving and utilizing their math concepts and computational skills.

Designing a Program of Your Own

Whenever I describe the active approach for learning mathematics to other teachers, they usually say, "If I had all those materials . . . . I could do it, too!" When I started my program, I didn't have the materials either. Teachers seem to lose sight of the fact that no one will just give you these materials. If you want to acquire these materials, you need a well thought out plan (you could even write it down on paper) for developing an active elementary mathematics program for your children.

Every teacher must first decide that he or she needs to evaluate their current program and then commit themselves to putting in the time and effort to accomplish the task. Don't forget to develop a program philosophy that is based on a learning theory you support and can document. When establishing an active mathematics program, the critical step appears to be in gaining the support of the building principal and then parents. These people can assist you in acquiring materials through Federal Title funds, the regular teacher supply budget and the PTA/PTO treasury. Finally, you must take your theoretical program, materials, and enthusiasm to the children and implement the program. This process will take time, but don't be discouraged. You are a risk taker; your program will not be perfected the first day, week or month. Evaluate what you are doing for children and revise your active mathematics program as needed.

Conclusion

I don't believe that the program I have described is either innovative or controversial (see the reference list). The program I described in this paper should be based on research in mathematics education, diagnostic/prescriptive teaching, pragmatic teaching experience, and being sensitive to the social, emotional and intellectual needs of children.

I am confident that you can operate a successful, active mathematics program without relying entirely on a commercial program or textbook. (I did for ten years.). You should always subject your program to a yearly evaluation and revision. Revise the program sooner if specific weaknesses become apparent. An active approach for learning mathematics is not perfect for every teacher or parent, but I hope this approach has stimulated some interest for those teachers who would like to consider an alternative to their current program.

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THE CHANGING GEOMETRY CURRICULUM

by MARLOW EDIGER
Northeast Missouri State University

During the 1960's with the advent and implementation of the concept modern mathematics, considerable mephasis was placed upon a kindergarten through grade twelve sequential geometry curriculum. Increasingly, in the later 1970's continuing in the 1980's, the lay public and selected educators desire a three r's curriculum – reading, writing, and arithmetic. These curriculum areas may also be called the basics in the school–class setting. To be a competent member in society, is proficiency in arithmetic, alone, adequate to be a functional person in the world of mathematics? As society becomes more complex, increasingly more is required of each individual to become a proficient member in society.

The balance of this paper will discuss possible rules of geometry in the mathematics curriculum.

The Pupil, Geometry, and the School Curriculum.

There are selected questions which need contemplation and answering pertaining to the scope of the mathematics curriculum. Among others, the following appear salient:

1. Which criteria need to be utilized to choose that which is relevant for each pupil to learn in the mathematics curriculum?
2. How can pupils acquire learnings in geometry which have utilitarian values in society?
3. How might learner interest and purpose be stimulated in units of study pertaining to geometry? The scope of the mathematics curriculum may well benefit from significant input from learners through teacher–pupil planning.
4. How may lay people be effectively involved in determining worthwhile objectives in the geometry curriculum?

Thus, viable answers need to be obtained to significant problems and questions in geometry. The end results will involve the choosing of understanding, skills, and attitudinal goals for pupils to achieve. Rational balance needs to be in evidence pertaining to emphsizing each of these categories of objectives. Vital subject matter learnings are felected within understandings objectives emphasized in teaching–learning situations. Adequate emphasis also needs to be placed upon skills ends. Learners may then utilize understandings acquired in functional learning situations. Attitudinal goals are extremely important to stress in ongoing units in geometry. Learners developing or possessing desirable attitudes toward geometry, no doubt, will achieve optimally in this curriculum area. Positive attitudes assist in pupil's achieving well pertaining to understandings and skills objectives.

ORDERING LEARNINGS FOR PUPILS

There may be a selected order of experiences which aids each pupil to achieve optimally in the geometry curriculum. It is difficult to know which the appropriate sequence of experiences is for a particular learner. Pupils individually do possess diverse styles of learning. The geometry teacher needs to ascertain if a pupil learns optimally from a concrete, to semi–concrete, to abstract sequence in benefitting from ongoing learning experiences. For example, in emphasizing pupil objectives pertaining to coordinates, the teacher may have a floor number line. One pupil may stand at a specific place representing negative two on the number line. A second learner may stand where a point represents a value of positive seven. Pupils with teacher guidance may now determine the distance in units between the coordinates negative two and positive seven. This may well represent a concrete learning experience – actual pupils are involved in this learning activity. Pupils with teacher guidance may discuss numerous practical transferable uses pertaining to coordinates. Abstract experiences with the use of numerals on a number line is also inherent in this learning activity. The teacher might have taught the lesson on coordinates without actual pupils or object involvement. Thus, a carefully selected filmstrip, a set of slides, and/or transparency with proper readiness experiences, may be utilized to guide pupils to understand the concept coordinates. For example, a filmstrip may contain a frame or several frames having a number line with animals represented at each of these points – negative two and positive seven. Learners may then hypothesize on the distance in units between the two values. The semi-concrete is a step removed from concrete experiences; the former is a drawing on an illustration in the filmstrip pertaining to that which is real. Although again, the abstract (numerals and the number line) is inherent in this learning experience. Ultimately, the abstract alone may be utilized to assist pupils to achieve optimally pertaining to coordinates.

A somewhat different psychology of teaching and learning (other than the concrete, semi-concrete, and abstract sequence) is a learning centers approach. Advocates of learning centers believe that pupils need to sequentially select tasks at diverse learning centers. Hopefully, each pupil will select tasks sequentially which harmonize with his/her optimal possible level of achievement. Not every pupil, by any means, will be working on the same task. Rather, a learner chooses either a concrete, semi-concrete, or abstract learning activity. The choice made may well depend upon the preferred style of learning of the involved pupil. If a pupil, for example, is achieving at a high level, he/she may prefer abstract activites and experiences. Advocates of learning centers believe that learners' attitudes improve as they select that which is interesting, meaningful, and purposeful. Not every task can be finished by any one pupil involving the utilization of learning centers in the class setting. If a pupil could complete all tasks, decision–making would be delimited to determining the order of activities to be completed only. Advocates of learning centers believe that pupils should truly choose which tasks to complete, as well as ordering these experiences. The involved learner then, not the teacher, generally sequences his/her own experiences. The teacher may solely have developed the learning centers and the inherent tasks. Teacher–pupil planning may also be utilized in determining tasks.

Humanists believe strongly in a curriculum of affect. Thus, the feelings and values of pupils are significant to consider. If a pupil is permitted to choose and to make decisions, a better self–concept may well be in the offing.

To often, a teacher largely selects objectives, learning activities, and evaluation techniques for pupils. This does not harmonize with the psychology of humanism in curriculum development. Input into the curriculum from pupils is important, according to humanists. A truly humane curriculum can be in evidence if pupils can choose and select that which is relevant to learn. Self–actualization is an important concept to implement in mathematics, as well as any other curriculum area.

ISSUES IN THE TEACHING OF GEOMETRY

There are numerous other trends,as well as issues which need receiving in the geometry curriculum. Among others, these include the following:

1. which objectives may best be accomplished by pupils utilizing inductive as compared to deductive methods of teaching and learning?

2. which means of pupil appraisal should generally be emphasized in ongoing units of study, e.g. teacher written test items, norm referenced tests, criterion referenced tests, and/or teacher observation of pupil's products? Inherent in this question might well be the basics in the curriculum plilosophy as compared to an increased emphasis placed upon projects and activities in teaching–learning situations.

3. should precise measurably stated ends be in evidence in the geometry curriculum or should objectives for learners to achieve be more flexible and open–ended, e.g. understandings, skills, and attitudes emphsizing general objectives?

IN CONCLUSION

Teachers, principals, and supervisors need to determine the role/roles of geometry in the mathematics curriculum. Relevant objectives and sequential experiences for pupils must be emphaiszed in teaching–learning situations. That which has been achieved/acquired must be utilized in the school/society arena.

HAVE YOU READ....?

Tony Rothman's article "The Short Life of Evariste Galois," in the **Scientific American** for April, 1982? To those of us brought up on **Men of Mathematics** by E.T. Bell, the short life of Galois - particularly to those of us entrusted with the nurturing of fertile young minds - was a source of collective guilt almost on a par with the treatment of the American Indian. If young Chip turned in a paper filled with incomprehensible scratches and a correct answer scattered here and there among them, we gave him an A, hopeful that our own pedestrain views would not someday be blamed for holding back a latter-day genius.

Rothman to the rescue debunks a lot of the myth surrounding Galois' life. He wasn't the unappreciated genius. He was in fact in contact with Fourier, Cauchy, Poisson, and other eminent mathematicians, and given more or less reasonable treatment by them. And he didn't spend the night before his death frantically trying to set down the essence of his creation. At most he made editorial corrections to a paper written long before.

Rothman also sketches Group Theory as Galois had developed it, and as he related it to the solution of polynomial equations. One can't hope to understand Group Theory from Rothman's sketch nor to see how the solvability of a group has anything to do with the solvability of an equation - the whole article can be read in thirty minutes - but he can understand the remarkable imagination Galois must have had to make a connection between such seemingly disconnected concepts. Rothman whets the appetite for further understanding.

In stripping away the hokum, Rothman has in no way belittled Galois or his works. If anything, he has added to Galois' stature as a mathematician and to his mortality as a human being. It is a fascinating article.

–Atmopav, April, 1982

TCTM ELECTION RESULTS, 1982

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TCTM Journal needs articles for all levels of Mathematics.

MOTIVATING STUDENTS TO LEARN ADDITION AND SUBTRACTION: THE CLASSROOM CANDY STORE

Buying and Selling candy in the classroom can be an effective way to motivate children to learn addition and subtraction. Children often find that learning addition and subtraction through the traditional textbook recitation approach is tedious and uninteresting. A classroom candy store can bring excitement, fun and relevency to learning these important math skills.

THE MATERIALS

Find several baby food jars and fill them with pieces of candy. Mark a price such as "7¢ on each jar. Then fill a paper sack with small slips of paper having "allowances" such as "45¢" marked on each slip. Make a sign announcing the candy store and display the jars of candy in a conspicuous place. Interest will be generated immediately when the first student discovers the candy store.

INTRODUCING THE CANDY STORE

Show the jars of candy and the candy prices marked on each jar. Explain that "allowances" in the sack can be earned during math time and spent in the cnady store. Define a procedure for earning an allowance such as "completing homework assignments on time," "scoring 80% or higher on a math assignment" or "passing a math test." Establish a time when the candy store will be opened for students to spend their allowances.

BUYING AND SELLING CANDY

When a student spends an allowance in the candy store, require him/her to state how many pieces of candy are desired, how much it will cost and how much "change" will be returned. Permit the student to use paper and pencil to solve the problem and allow a reasonable amount of time. Allow only one chance to buy the candy. If the student is correct, sell the candy and give change (piece of paper with amount of change written on it.) If the student is incorrect return the allowance to the paper sack.

Adjust the difficulty of the problems in the candy store to the needs of the students. For example, give smaller allowances and less expensive candy to those who are struggling with addition and substraction. This will eliminate the more difficult problems requiring regrouping.

Opening the Candy Sotre will come as a complete and delightful surprise to students. Motivation to learn addition and subtraction will increase as students realize that these skills are needed to buy candy. With motivation increased, students will become more involved in their math lessons and chievement will increase. And, because children like the things they do well, the Candy Store approach will help students develop a more positive attitude towards Mathematics.

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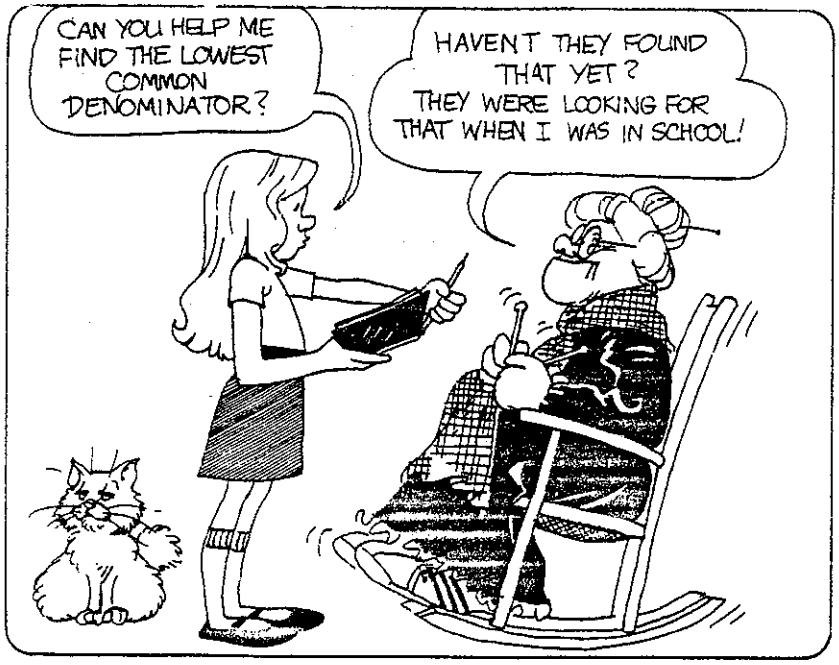
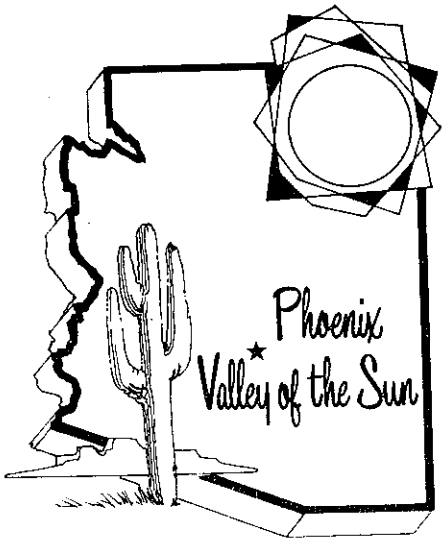


"No, Jeff, I don't think math homework is what the Founding Fathers were thinking of when they banned cruel and unusual punishment."

MARK YOUR BOOK!



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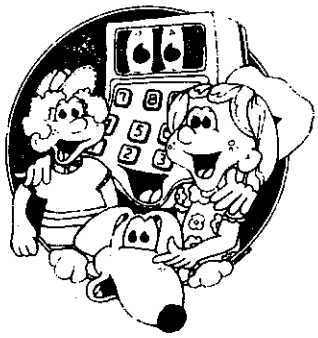
PROBLEM SOLVING SCAVENGER HUNT



Joan Duea, Earl Ockenga, and John Tarr

We can all use ideas for creating interest in problem solving. Try this problem solving activity with your students.

Materials

Student Math Textbook
Paper
Calculator (optional)

Directions

Use your textbook to go on a problem solving scavenger hunt. Write the page number and the number of the problem.

1. Find a word problem in which the answer is a number of dollars.
2. Find a word problem in which the answer is between 60 and 100.
3. Find a word problem in which you need to both add and subtract to solve it.
4. Find a word problem in which you add and get an answer greater than 500.
5. Find a word problem in which your answer is not a number.
6. Find a word problem in which you divide to get the answer.
7. Find a word problem in which the answer is a number of miles or kilometers.
8. Find a word problem in which the answer is not a whole number.

For information about problem solving units for grades 5-8, write: Project Impact, Price Laboratory School, Room 146, Cedar Falls, IA 50613.

CONFERENCE FOR THE ADVANCEMENT OF MATHEMATICS TEACHING

CAMT 29th Annual Conference November 11-13, 1982 Austin, Texas

Conference Pre-Registration:

Individuals may pre-register for CAMT by completing and returning the form below, along with a check for fees. Pre-registration information must be received by CAMT by **October 22, 1982.**

Beginning at 9:00 a.m. Thursday, November 11, packets for those who have pre-registered will be available at the CAMT Registration Desk, Palmer Auditorium, Main Floor.

Fees:

Pre-registration (Cutoff Date: October 22, 1982)	$ 7.00
On-site Registration (Palmer Auditorium, Main Floor)	10.00
Student Registration (Verified)	3.00
Registration for Saturday Only (On-site)	3.00
Workshops (Each)	3.00
Luncheon	8.00

Detach and return registration form to: L. Ray Carry, CAMT Registration
Department C&I, EDB406
U.T. Austin
Austin, TX 78712

Pre-Registration Form

Pre-Registration (Cutoff Date: October 22, 1982) . . . . $________

Luncheon . . . . ________

Workshops:

Supply identifying numbers from the program for each workshop you wish to attend. (See inside front cover for additional information.) Admission to sessions labeled workshop is by ticket only. The cost is $3.00 per workshop. Pre-registration will be limited to a total of three workshops per person with no more than one of the three being a computer workshop. (If requested workshops and alternates are closed, a refund receipt will be provided in the pre-registration packet to be redeemed at the registration desk.)

1st Choice of Workshops: #________ #________ #________

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Workshop Ticket Amount (Maximum of $9.00) . . . . ________

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No refunds will be made on cancellations received after the conference begins.

(Please Print) Name ________________________

Mailing Address ________________________

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Hotel Information

The Hyatt Regency Austin will be the conference hotel with Thursday evening events scheduled there. For reservations at conference rates at the Hyatt Regency, complete the form below. The hotel must receive reservation requests by October 20, 1982.

(DETACH & RETURN)

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Wednesday, October 20, 1982

Rooms subject to availability after this date.

(Print or Type)

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2)_____

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ARRIVAL DATE_____ TIME_____

DEPARTURE DATE_____

HOTEL CHECK-IN TIME: 3:00 p.m.
HOTEL CHECK-OUT TIME: 12:00 noon

GROUP: Conf. for Advancement of Math Teachers TEA-TCTM-TASM-U.T.

DATES: **November 10-13, 1982**

Your reservation will be held until 6:00 p.m. on specified arrival date unless one night's deposit (room and tax) is received or **assured** by credit card below.

☐ Hold room until 6:00 p.m. (not guaranteed)

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NOTE: Specific accommodations and room assignments will be determined upon check-in, according to room availability at that time.
If you must cancel these reservation plans, we appreciate your courtesy in contacting our reservations department or by dialing 1-800-228-9000.

The following hotels are also available in the conference area and may be contacted directly:

- The Driskill Hotel, 117 E. Seventh St., Austin, TX 78701 (512) 474-5911 (800-252-9367)
- Ramada Inn Capitol, 300 E. 11th, Austin, TX 78767 (512) 476-7151 (800-228-2828)
- Sheraton Crest Inn, 111 E. 1st St., Austin, TX 78768 (512) 478-9611 (800-325-3535)
- Imperial 400 Motel, 901 S. Congress, Austin, TX 78704 (512) 444-3651 (800-531-5300)
- Rodeway Inn—Capitol, 1201 N. IH 35, Austin, TX 78702 (512) 472-8331 (800-228-2000)
- Rodeway Inn-University, 2900 N. IH 35, Austin, TX 78705 (512) 477-6395 (800-228-2000)
- Villa Capri Motor Hotel, 2400 N. IH 35, Austin, TX 78705 (512) 476-6171 (800-528-1234)
- Holiday Inn Town Lake, 20 N. IH 35, Austin, TX 78768 (512) 472-8211 (800-238-8000)
- Ramada Inn South, 1001 S. IH 35, Austin, TX 78741 (512) 444-3611 (800-228-2828)
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*I certify that I have never taught professionally _____ *(Student Signature)*

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