Mathematics Council NEWSLETTER
The Alberta Teachers' Association

From the Editor

There is no doubt that attitudes formed at a young age play an important role in students' selection, participation and achievement in mathematics as the students mature.

The following NCTM position paper (from the *NCTM 1994–95 Handbook*) outlines the situation well.

Guiding Students' Attitudes and Decisions Regarding Their Mathematics Education

Educators, including parents, teachers, counselors and administrators, are positioned to influence the formation of students' attitudes toward, and perceptions about, mathematics. These attitudes and perceptions are formed at an early age and are reinforced by educators throughout the students' school years.

The following issues should be addressed at all levels:

- Equal access to the world of mathematics regardless of gender, ethnicity or race
- The broad range of options available to students of mathematics
- Success in mathematics depends more on effort and opportunity to learn than on innate ability

For students to succeed in their study of mathematics, they must believe that they can "do" mathematics and that it is worth "doing." Therefore, the National Council of Teachers of Mathematics believes the following statements should characterize student programs:

Elementary School Level

Young children enter school having natural interest, curiosity and an eagerness to learn. As children move through the elementary school level, educators build on these attitudes, which support children's mathematical development. By connecting mathematics with real-life experiences, educators can help children not only understand mathematics but also see its value and usefulness.

Middle School Level

During the middle school years, students experience the greatest changes in their development. During these years, educators must continue to provide encouragement to students and enable them to develop confidence in their ability to make sense of mathematics. A focal point for this age group is making connections between mathematics and their future options so that their academic and work-related choices are kept as broad as possible.

Secondary School Level

At the secondary school level, students should recognize the importance of the relationships between academic choices and career choices. Educators must reinforce students' belief in the value of mathematics, in their ability to "do" mathematics now and in the future and in their need to continually learn.

In addition, students should continually be provided with reliable, up-to-date information on

- how what they are learning in mathematics relates to future options;

- the increasing number of career opportunities available as a consequence of further mathematical study;
- how careers in fields other than mathematics and the physical sciences depend increasingly on mathematical knowledge;
- their school's graduation requirements in mathematics; and
- the entrance and graduation requirements in mathematics for vocational schools, technical schools, colleges and universities.

Therefore, the NCTM recommends that all educators, including parents, teachers, counselors and administrators, work together to shape, guide and inform students' attitudes, perceptions and decisions regarding their education in mathematics. ▲

—Art Jorgensen

Manipulation Is IN at Swanavon School

Swanavon teachers Marion Pawlivsky, Barry Longson, Donna Hopkins and Helen Neufeld are busy preparing a series of staff workshops using hands-on activities to enhance children's understanding of mathematics. To facilitate the workshops, they received a $500 grant from MCATA. ▲

—Cindy Meagher

From the President's Pen

Taken from the President's Report, MCATA Annual General Meeting, October 20, 1994.

Being president of the Mathematics Council this past year has been exciting and rewarding. The position has afforded me, a classroom teacher, unique access to information, processes and people. The most enjoyable part of the job continues to be working with a group of professionals dedicated to promoting and enhancing teaching mathematics in our province.

The executive met four times last year—three times in Red Deer and once in Calgary, at the conference in the fall. At our annual Thinkers' Conference in January in Red Deer, we continued work begun the previous year in four main areas: publications, conferences, membership and issues. MCATA will receive grants from the ATA based on a membership of 599 for the 1993–94 year.

The Calgary conference in October 1993 was a great success, attracting almost 700 participants. Congratulations to Bob Michie and all committee members. Florence Glanfield and her committee have spent countless hours over the last two years organizing "Changing Directions." Thanks to Myra Hood and Florence Glanfield for their work in organizing highly successful resource fairs and mini-conferences in Calgary and Edmonton.

A strength of MCATA continues to be our excellent publications. Two issues of *delta-K* were published, thanks to Craig Loewen. Art Jorgensen continued to keep our members well informed via five issues of the *Newsletter*. Thank you, Art.

Executive members attended a number of conferences during the year. Dennis Burton represented MCATA at the NCTM Annual Conference and Delegate Assembly in Indianapolis in April. Other executive members serving on NCTM committees were Florence Glanfield and Richard Kopan, Regional Services Committe, and George Ditto, Convention and Conference Committee.

For the first time, specialist councils were given observer status at ARA in May. Thanks to Past-President Bob Hart for representing the Math Council.

The Math Council financially supported three math contests—junior high contests in Edmonton and Calgary and the Alberta High School Math Contest—as well as funding materials for a teacher inservice project. Congratulations to Florence Glanfield and Richard Kopan, who, on behalf of the Council, were granted Special Project Grants from the ATA and NCTM to fund the writing of assessment tasks for junior high mathematics. MCATA, in partnership with the Alberta Assessment Consortium, brought 65 teachers to Edmonton in August to work on this project, the results of which will benefit teachers provincewide.

I thank all executive members for their work over the past year. They can be proud of all that MCATA has accomplished. I would also like to give special thanks and recognition to Bob Hart, past president, and Dave Jeary, ATA staff advisor, without whose help and advice I never would have survived my first year as president. ▲

—Wendy Richards

Interprovincial Mathematics Project

Have you ever felt frustrated when the texts and support materials for the mathematics courses you teach are not synchronized with the Alberta curriculum? How about the frustration when students transfer from another province and their background doesn't quite fit the Alberta curriculum? Are you concerned with the costs when four departments of education each design their own curriculum? Thirty-six math educators met in Regina last August to work on providing a better curriculum more efficiently. The group will develop a draft set of common essential learnings in mathematics from K–12.

In November 1993, the ministers of education of Manitoba, Saskatchewan, Alberta, British Columbia, Yukon Territory and the Northwest Territories signed the Western Canadian Protocol for Collaboration in Basic Education (Kindergarten to Grade 12). Mathematics was identified as one of the areas on which to collaborate. After preliminary organizational work, the 36 teachers met in Regina. Three teachers from the ATA curriculum circle—Diane Congdon, Wendy Richards and I—were part of the Alberta team.

At the end of our work in Regina, we had developed a draft curriculum at the level of general learner outcomes for all grade levels. (At the 9–12 level, development concentrated on the "academic stream" only.) I was amazed at the amount of agreement on choice of topics, approach and emphasis. Work continued at meetings in November. More information will follow.

(The Maritime provinces are engaged in a similar project. Wouldn't it be nice if east and west could collaborate? The four western provinces are already collaborating in areas such as preparation of distance learning and CAI materials.)

—*Marion Oberg*

Dennis Burton interviewed Alberta Education Coordinator Hugh Sanders at the MCATA Conference, October 22, 1994, about the Interprovincial Mathematics Project. The results of the interview follow.

The math component of the curriculum is to be finished by January 1995. The education ministers have mandated that the K–3 component be available for use in fall 1996. The outcomes will have three components. First are the general outcomes from K–12. Second are specific outcomes related to the general outcomes. Third will be the illustrative examples for clarity of the specific outcomes. The focus of the material will be on what the students can do using student outcome statements. This draft has not been widely circulated, as it was revised by the team at meetings in Edmonton, November 14–16. This second draft will then be circulated throughout the provinces and territories for feedback. The publishers have been made aware of the proposal to enable them to plan appropriately for preparing support materials.

One implication in Alberta will be incorporating these ideas into the junior high curriculum, which is being revised. The new Math 31 curriculum is unaffected, as it was not included in the common curriculum proposal. The new curriculum will be seamless, with no major jumps in difficulty at the seventh and tenth years. Topic development will not be repeated from year to year unless pedagogically sound. This curriculum will be followed by the development of similar standards in language arts and then science. There are no plans to develop similar interprovincial assessment standards. ▲

The Right Angle

News from Student Evaluation

Diploma Examinations Program

The following is an excerpt from the 1994–95 *Mathematics 30 Information Bulletin.* Please read this and let us know your opinion.

Directions for the 1995 Field Tests and the 1996 Diploma Examinations

The 1995 Mathematics 30 field tests will continue to include questions that require students to describe their method of problem solving and to communicate their descriptions of mathematical definitions and situations. Furthermore, field tests will also include items that assess how well students have achieved the general learner expectations stated in the *Mathematics 30 Course of Studies.* Students will be challenged to show that they understand mathematical concepts and can apply them in real-life situations.

The blueprint for the 1996 Diploma Examinations will consider the machine-scored section of the examination separate from the written-response section. The machine-scored section of the examination will comprise 70% of the examination and the written-response section will comprise 30%.

The machine-scored section of the examination will cover the core content of the course while the written-response section will cover how well students meet the general learner expectations for Mathematics 30. The number of questions in the machine-scored portion of the examination will not change, however there will be three written-response questions.

The written-response questions will assess whether or not students can draw on their mathematical experiences to solve problems and to explain mathematical concepts. Therefore, the written-response questions will not necessarily fall into a particular unit of study but may cross more than one unit or may require students to make the connections between mathematical concepts.

During the 1993–94 school year, we field tested questions that asked students to do this. An interesting thing that we noticed when field testing questions such as this is that students are very willing to attempt the questions and there are very few "no responses."

To preview the questions, see pages 13 to 15 of the 1993–94 *Mathematics 30 Information Bulletin.* For more information about Mathematics 30, phone Florence Glanfield or Lowell Hackman at 427-0010 or fax 422-4200.

A *Mathematics 33 Diploma Examination Newsletter* was distributed to all schools this fall. An important part of the newsletter is a questionnaire for Mathematics 33 teachers. Please complete the questionnaire and mail it to Alberta Education. If you did not receive a copy of the newsletter or would like more information about Mathematics 33, phone Ron Flaig or Lowell Hackman at 427-0010 or fax 422-4200. ▲

—Florence Glanfield,
Alberta Education Representative
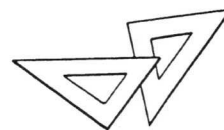
1994 NCTM Canadian Regional Conference

Edmonton, October 20–22, 1994

MCATA hosted the 1994 NCTM Canadian Regional Conference. Over 1,400 mathematics educators from across Canada attended the day-and-a-half conference. Delegates received tote bags donated by Nelson Canada and rulers donated by MCATA celebrating NCTM's 75th Anniversary.

Special thanks go to all speakers, presiders, committee members, students and exhibitors who worked hard to make sure the conference was a success.

At the opening session on Thursday evening, October 20, 1994, the Honorable Halvar Jonson, Alberta minister of education, brought greetings on behalf of the province. Mary Lindquist, NCTM past-president, opened the conference with the topic "Celebrating Mathematics Teaching: Everybody's Heritage, Everybody's Future." Mary brought an interesting perspective to teaching mathematics—where we've been and where are we going. Change is happening in mathematics education, and we teachers need to prepare ourselves and be poised for this change.

A performance of *Fermat's Follies or Marginally Mathematical Music* with Keith Molyneux and Ernest Enns followed Mary's presentation. There were a lot of laughs with Keith's and Ernie's view of mathematics through music. In their repertoire, they included a celebration of NCTM's 75th anniversary.

The next day-and-a-half were full of workshops and sessions that kept conference delegates busy.

Saturday morning we held our first "conference breakfast." Miriam Leiva, member of the NCTM Board of Directors, spoke on "Celebrate Math Power." Miriam talked about how we teachers think of mathematics and that sometimes we miss the "mathematical power" our students can demonstrate because we are thinking of mathematics in one particular way.

On Saturday afternoon, David Clarke from the University of Melbourne in Australia gave the closing session. David's talk addressed "Charting the Territory: Landmarks in Contemporary Mathematics Education" and left us with thoughts of our role in contemporary mathematics education.

In addition to providing exhibits for the conference, the following publishers provided their support:

- Addison-Wesley Publishers
- Didax Educational Resources
- Exclusive Educational Products
- Gage Educational Publishing
- Ginn Publishing Canada, Inc.
- Irwin Publishing
- Les Éditions de la Chenelière
- Nelson Canada
- Texas Instruments Canada Limited

Overall, the conference was successful, and we look forward to MCATA's 1995 conference in Lethbridge. ▲

—*Florence Glanfield*

Behold turtles—they make progress only when they stick their necks out.

1994 Outstanding Mathematics Educator Bob Michie

Bob Michie received the Outstanding Mathematics Educator Award at the 1994 NCTM Regional Conference in Edmonton.

Bob has a long history of involvement in mathematics education. He began his career in 1964 in Swift Current, Saskatchewan. After two years of teaching mathematics, science and physics from Grades 9–12, Bob joined the Calgary Board of Education (CBE) in 1966. He has served the Board in many capacities: mathematics and science teacher, mathematics department head in four high schools, mathematics consultant (three years), mathematics supervisor (4½ years) and currently as an assistant principal. Bob attributes the enjoyment of each of these roles to the various people he had the pleasure to work with.

Bob appreciates the various opportunities a large system like CBE offers. When asked about his most rewarding experience during his career, he reflected on his first year as department head at John Diefenbaker High School. It was the beginning of a new "open area" school with only Grade 10 students and "a group of people (teachers and students) who were totally involved in learning and discovering new and different things."

Bob has been involved with MCATA since 1981, serving in many roles: director, vice president, president, past president and conference director. Bob was conference chair of the highly successful 1993 Calgary Mathematics Conference. Although Bob often credits others for many of his achievements, his abilities and achievements, recognized by CBE and the Mathematics Council, allowed him to serve in various roles.

Currently, Bob is assistant principal at Sir Winston Churchill High School. He enjoys being back at school and credits the school's success to its focus on students and their learning. He enjoys working with a staff that is "continually reflecting, examining and questioning what they are doing, and are always looking for ways to become even more successful."

Bob states that he could never have chosen a better career: "It has been truly rewarding." His enjoyment of teaching has been handed down to his daughter, who is also a teacher. Bob is particularly proud that one of his students has become a math teacher.

What does the future hold? Bob is happy in his current position. Retirement is a few years away, but even after that he believes he will be involved with teachers in some capacity.

Bob shared his philosophy about teaching: (a) never quit learning and (b) become a student of students' thinking. ▲

Help for Calculus Teachers

Despite the best efforts of many highly skilled and dedicated professionals, a significant gap exists between what typical high school students know when they enter university and what a professor assumes they know. Nowhere is this more apparent than in beginning calculus.

In summer 1992, with the backing of private sponsors, I persuaded the University of Alberta to open the Mathematics Resource Centre. This Centre would support students having difficulty making the transition to university mathematics—in particular, beginning calculus.

Two years and almost 5,000 students later, the Centre is alive with activity. As director, I talked to many students and tailored the programs to fit their particular needs.

Apart from precalculus workshops, the exam review sessions are perhaps the most significant in influencing student performance.

I have moved on to new experiences in the Department of Mechanical Engineering, but I still maintain an active interest in "the first-year experience."

This year, I compiled a booklet, *Exampac*, of five midterm and five final examinations in a typical beginning calculus course, with fully worked teaching solutions. Math 31 and first-year university students have used *Exampac* for practice in major aspects of beginning calculus and exam technique. Copies of *Exampac* are available at the University of Alberta Bookstore ($18.50) or can be ordered directly from me, Peter Schiavone, Department of Mechanical Engineering, 4-9 Mechanical Engineering Building, University of Alberta, Edmonton T6G 2G8. ▲

—Peter Schiavone

2 Apples + 5 Oranges = Something

Mathsemantics—Making Numbers Talk Sense by Edward MacNeal, 310 pages, Viking Penguin, 1994, ISBN 0-0670-85390-9

This book gives a possible method of joining mathematics and semantics into a new area of study which the author tentatively calls "mathsemantics." MacNeal writes with great clarity and is able to bring about the process while teaching the reader along the way a number of valuable insights into how children learn and how adults use language and mathematics.

MacNeal is an aviation consultant first and foremost. He has been called as an expert witness in various courts and hearings. He draws most of the substance of the book from a quiz given to people who responded to a position advertised by his company. It asked people to be "good at numbers." He also draws heavily from his knowledge of air transport planning and Piagetian psychology. Not all the examples drawn from the airport industry were clear to me, but the majority were.

The chapters are usually a study of a few questions from the quiz given to the job applicants. The opening chapter covers the question: 2 apples + 5 oranges = _____. The author explores this not just from the mathematical viewpoint but also from the viewpoint of how elementary mathematics is taught and how children use language. His "correct" answer is to say 7 fruit because the word *fruit* captures apples and oranges. I was surprised that so many people said it was impossible, apparently echoing the words of a past teacher.

MacNeal explains the source of each wrong answer, having usually discussed the answer with the quiz writer, but not always. This may be the weakest point in the book. My experience is that, while it may seem obvious to me as a teacher what the student did to get a wrong answer, I sometimes find in discussion that I had assumed incorrectly. Diagnosing error patterns without direct questioning of test writers is dangerous and unsupportable.

MacNeal deals with most really tough questions that plague mathematics teachers. I hope he helps teachers of English in the same way. He observes that many of the problems the job applicants had were associated with a vague understanding of the meaning of the words used. He looks carefully at the use of statistics that purport to count people, when they really count events. An airport may have 200,000 people depart from it in one year, but many of these are the same person counted two or more times. I have been paying more attention to the Edmonton airport debates ever since.

The book ends with the quiz used by all 196 people who responded to the job advertisements. You are invited to try it before reading the book. I chose not to but now regret missing the chance. I encourage you to seek this book out. ▲

—*Martin H. Badke*

The only difference between stumbling blocks and stepping stones is the way we use them.

Math Activities

The following activities are taken from the NCTM publication Teaching Children Mathematics, *Volume 1, Number 3, an NCTM publication.*

K–2

How can you measure the distance across the room using only your body? How many steps is it? How many hops? Compare the distance you measured with the distance a classmate measured. Are they the same or different? Why? What other ways can you use to measure the room using part or all of your body? Make a chart to show the distances measured in as many ways as you can. Can you explain why numbers are different when measured in different ways?

3–4

How far can you walk in one minute? Make and test a prediction. How will you measure the distance you walk? Predict how far you can walk in one minute and in one hour. Would you use a different unit of measure? What other factors would you consider to make an accurate prediction? What effect would walking uphill or getting tired have on the distance walked?

5–6

Find two pints outdoors, for example, the corner of a fence and a tree. Estimate the distance between the two points. Design a plan to estimate the distance more accurately without measuring the entire distance. Write a description of the plan and then use your plan to revise your estimate. Measure the actual distance and compare this measurement with your first estimate and your revised estimate. Which was closer to the actual measurement?

Upcoming Events

Celebrate NCTM's 75th Anniversary in Historic Boston

Festivities celebrating NCTM's 75th anniversary will culminate at the Council's 73rd annual meeting in Boston. The meeting, "Mathematics: Everybody's Heritage, Everybody's Future," is scheduled for April 6–9, 1995. According to NCTM President Jack Price, the change in conference days should allow more teachers to attend because less time is needed away from the classroom.

As part of NCTM's 75th anniversary celebration, the Council has lined up the renowned Boston Pops to perform on April 7. Saturday's entertainment will feature a special banquet complete with a video presentation highlighting NCTM's accomplishments and its vision for the future.

NCTM kicked off its 75th anniversary celebration in September. Special promotions, including "The World's Largest Math Event," are being planned to unite the public and the mathematics community in their celebration of mathematics.

Make the Connection at NCTM's 1995 Topic-Specific Seminars

See and build connections to the NCTM Standards through measurement, geometry, and probability and statistics at one of NCTM's three activity-based seminars on "connections."

Each "connections" seminar will highlight connections made to the NCTM Standards, real life, technology, research, instruction, literature, performance-based assessment, mathematical strands, content areas and more. Participants will do mathematics, make connections with colleagues, explore strategies to help all students make sense of mathematics, communicate through and about mathematics, and reason and solve problems. In addition, there will be mixed K–12 sessions and grade level sessions (K–4, 5–8, 9–12), with time allocated for attendees to reflect, write and interact.

The two-day seminars are tentatively scheduled for Tampa, Florida, January 27–28; Long Island, New York, February 23–24; and Casper, Wyoming, August 3–4. Seminar fees are $200 for NCTM members and $250 for nonmembers and include lunch each day and all handouts. For more information, contact the NCTM conventions department at (703) 620-9840, ext. 143.

1995 Conference

The 1995 Mathematics Council Conference will be held on September 29–30 in Lethbridge. The theme is "Math Trek: The Next Generation." Stay tuned for more details. If you have ideas for speakers or other aspects of the program, contact Conference Cochairs Mary Jo Maas or Arlene Vandeligt (see executive list).

1996 Conference

Archie Coderre, Graham Keogh and Al Quinn have agreed to lead organization of the MCATA annual conference in Red Deer, November 1–3, 1996. The University of Calgary conference office will assist as it has in the past. MCATA executive members will help if enough Red Deer and area people are unable to assist.

Joint Conference, Spring 1996

The Science and Social Studies Councils have indicated an interest in the possibility of organizing a joint conference with MCATA. ▲

NCTM Regional Services Committee Update

Something Old, Something New

Encourage teacher educators to take advantage of NCTM materials and resources! The established mini-subscription program is available, and, in January 1995, the new "Starter Kits for Mathematics Teaching" will be offered. Contact NCTM Headquarters Office, Department M, for more information.

Retiree Recruitment

Affiliated Groups (AGs) should consider actively soliciting retirees to become or remain involved in local, regional or state or provincial professional organizations. Eligible for a complimentary membership, retired NCTM members have the option to subscribe to NCTM journals for $15 annually per journal. Membership application forms for retirees are available from your regional services committee (RSC) representative or NCTM Headquarters Office, Department M.

Consignments

AGs can order NCTM publications and special products on consignment. The program is described in the *Handbook for Affiliated Groups of NCTM.*

Important Reminders

- Furnish your RSC representative and the NCTM Headquarters Office with any changes in AG officers' names, addresses or phone numbers.

- Special benefits are available for teachers in elementary schools with NCTM institutional memberships. Benefits include reduced conference registration fees and an opportunity to receive *Teaching Children Mathematics*, which supplanted the *Arithmetic Teacher*, at a reduced price. Details are on the Institutional Membership information sheet and application form in the front pocket of the AGs' *Handbook*. Additional application forms are available from NCTM, Department M, phone (703) 620-9840, ext. 113.

- Undergraduate students who are members of NCTM may have NCTM regional conference and annual meeting registration fees waived. The current student membership fee is $22.50. ▲

Plan your work, then work your plan.

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