

Mathematics Council NEWSLETTER

The Alberta Teachers' Association

Volume 8

Number 2

December 1989



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From the Editor

Most mathematics teachers recognize the need for effective staff development; unfortunately, there is a critical shortage of superior inservice workshops. The California Mathematics Council (CMC) has developed a position paper on staff development that could serve as a model for Alberta.

The 10,000-member CMC believes professional organizations should play a major role in shaping the professional development of teachers. Although it feels that mathematics teachers are facing unique challenges, we feel our interests are best served by providing teachers with ongoing, high quality staff development. A statement of our position on professional development follows.

- I. Teachers should play a major role in planning, implementing and evaluating staff development programs that are designed for them.
 - A. Planning should take place at the school level by a committee composed of a majority of teachers. The purpose of this committee is to
 1. develop a coherent three- to five-year staff development plan that presents a rationale for the selection of issues addressed, describes the format and sequence of their delivery and determines which activities are appropriate for which teachers;
 2. promote collegiality by involving all teachers at a school site in staff development activities;
 3. respond to the individual need of the teachers by providing flexibility in content and timing of staff development activities;



4. provide for coordination among subject matter initiatives, recognizing that staff development in each subject must be sustained over a period of time beyond the adoption year;

5. correlate staff development of administrators with that of teachers.

B. Successful program implementation is based on teacher involvement.

1. Wherever possible, teachers should be the instructors in the staff development program.

2. It is essential to provide teachers with sufficient time and/or resources to support their involvement.

3. Teachers also need access to resources to implement instructional changes based on their staff development experiences. Programs such as the Classroom Teacher Instructional Improvement Program (CTIIP), mini-grants and so on provided this support in the past. Some similar mechanism should be restored.

C. Teachers' assessment of the success of staff development efforts should be considered the crucial factor in evaluating staff development.

1. Evaluation should be ongoing and should provide input to the continuing process of planning staff development programs.

II. Staff development for those teaching mathematics should be consistent with the Mathematics Framework, the K-8 Model Curriculum Guide and the Model Curriculum Standards.

1. Mathematics teaching requires subject-specific staff development.

2. The link between content and delivery of instruction must be demonstrated consistently.

3. Integration with other subject areas should not be attempted without a well-established mathematics program consistent with the Mathematics Framework.

4. Staff development must be conducted in the same manner as teachers teach their students, so that the experiences of the teacher become a model for the experiences of the learner.

5. Generic teaching strategy workshops are unlikely to meet these criteria and are often at odds with them.

III. Staff development should be adequately supported with financial, human and institutional resources.



- A. Implementing successful staff development requires significant financial resources. The level of support for mathematics must be responsive to the dramatic changes in our society; they require a substantially increased competence in mathematics, science and technology for all our citizens.
1. Until mathematics curriculums are changed from a nineteenth century arithmetic program to a twenty-first century problem solving program, everyone teaching mathematics needs at least four days of mathematics staff development each year.
 2. Resources are required to provide materials and cannot be limited to textbooks alone.
 3. Released time must be available for teachers, not only to attend inservice sessions, but also to promote collegiality, that is, time to meet and plan with other teachers, to observe other teachers, and to coach and be coached.
 4. Professional development is impossible if substitute teachers are not available to provide released time. District policies must place a priority on providing qualified substitute teachers so that staff development activities may be reliably planned and conducted.
 5. Staff development activities for teachers should be conducted in the same manner as they are for other professions.
- B. The goal of staff development is to maximize the potential of the teachers in the school.
1. Selected teachers from each site should be given the opportunity to attend in-depth, month-long institutes, as well as subsequent time to share their knowledge with colleagues.
 2. Teachers who lack sufficient background in mathematics and teaching mathematics must be given support to obtain additional courses in mathematics content and pedagogy.
 3. At each school, one person should be responsible for insuring that teachers receive support to match their needs and priorities. The recommended level of support for elementary school teachers is one resource specialist for a maximum of 100 teachers.
 4. Support for secondary school teachers may be provided via mentors, department chairs or other teachers who have the mathematics teaching expertise, the time and the interest in providing assistance.
- C. Significant institutional change is required to support successful staff development in California.



1. Changes at the school site must be made so that assessment of students and teachers is consistent with curriculum content and improved instructional practices.
2. Knowledgeable site/district administrators must be available to comprehend the necessary changes, support long-term teacher development, and advocate these changes when working with parent and other constituent groups.
3. At the state level, California should create projects, similar to the California Writing Project and the California Mathematics Project, in all major curricular areas and provide month-long, in-depth staff development for teachers who take a leadership role in their schools. Sufficient resources must be available to serve all geographic areas of the state and to provide continuing support to past participants of projects.
4. Regional centres should be established to provide ongoing staff development consistent with the above principles. Unlike specific subject projects, which provide intensive staff development for relatively few teachers, regional centres have the potential to reach the majority of teachers in the state.

As educators, we are aware that our future society is directly related to the quality of today's classroom. Professional growth activities are vital to improving the educational system.

The Right Angle

Using a Teacher Resource Manual

Alberta Education is developing teacher resource manuals to replace the Curriculum Guides. The manuals will contain the same information as the guides and will assist teachers in the implementation of new programs and courses.

The manuals will help teachers interpret the Course of Studies statements (legal statements incorporated into the manual) provide ideas for problem solving and process activities during teaching, give suggestions for incorporating the calculator and computer into the classroom, and supply comments on potential elective areas and problems. The ideas and suggestions contained in the manuals are suggestions only. Course of Studies statements are the only areas that must be covered in the classroom.

If you have any questions regarding the use of the manuals, please contact Florence Glanfield, Coordinator, Mathematics, Curriculum Support Branch, 5th Floor, Devonian Building, West Tower, 11160 Jasper Avenue, Edmonton, Alberta T5K 0L2; phone (403) 422-4872; FAX (403) 422-5129.



MATHEMATICS TEACHERS

Are you using a computer in your math class?



Alberta Education is producing a computer integration guide for mathematics, grades 4 - 9. We hope to have this document ready for schools by fall, 1990.

To make this document of more interest to teachers, we would like to include lesson plans with software approved by Alberta Education (see summary of authorized software in Computer Courseware Evaluations, Volume VIII).

Alberta Education is inviting teachers of mathematics to submit lesson plans which have been successful in their classrooms. Lesson plans may be for a single lesson or a series of lessons on the same topic. Each plan submitted should be for a class of 30 - 40 minutes in length and include:

Teacher Identification: Teacher:
 Mailing Address:
 School:
 School Address:
 School Phone Number:

Lesson Plan: Grade Level:
 Objective/Statement:
 Teacher Preparation Needed:
 Teacher Tips (if applicable):
 Student Preparation Needed:
 Resources Needed:
 Suggested Student Activities:
 Evaluation Suggestions:
 Elective Suggestions:

Material that is accepted for publication will include the author's name and address unless otherwise requested. All plans submitted will not necessarily be published.

If you are interested in having one or more of your plans included in our document, then fill out the form at the bottom of this page and include it with your lesson plan by February 28, 1990.

Submissions are to be sent to: George Campsall
 Technology Resource Officer
 Technology and Resource Integration Unit
 Curriculum Support Branch
 Alberta Education
 11160 Jasper Avenue
 Edmonton, Alberta
 T5K 0L2

I hereby authorize Alberta Education to publish and use my plans, of which I am the author, in any revised manner for use in the computer integration guide for a period of 5 years from the date indicated below. Copyright for this information will reside with Alberta Education. This information will be made available to all teachers in Alberta and may also be made available to other Departments of Education.

Signature

Date

What's New?

Puzzles Old and New

Ottawa's National Museum of Science and Technology is hosting a display of mathematical and mechanical puzzles entitled Puzzles Old and New, until January 2, 1990. The display, selected from the collection of Jerry Slocum, an authority on the history of such puzzles, features puzzles from bygone days as well as more recent additions, such as Rubik's Cube. Visitors can test their ingenuity and creativity at the hands-on displays.

Jerry Slocum has published a book, also entitled Puzzles Old and New. It is distributed by the University of Washington Press, P.O. Box 55096, Seattle, Washington 98145-5096. The exhibit and the book are strongly recommended.

Books from Down Under

As part of its 1988 bicentennial celebration, Australia hosted the International Mathematical Olympiad (IMO) under the leadership of Peter O'Halloran. The spirit of the olympiad is captured in An Olympiad Down Under, a 240-page book containing 120 photographs, 90 questions and solutions, and 50 pages of statistics.

The Toolchest-Mark 2, begun by Jim Williams and completed by the Australian Mathematical Olympiad Committee, is a compilation of olympiad-level mathematical skills.

These books may be ordered from the Australian Mathematics Competition, Canberra College of Advanced Education, P.O. Box 1, Belconnen, ACT 2616, Australia.

Mathematics for the Younger Crowd

The following materials are available from Foothills Educational Materials, 13027 Lake Twintree Road SE, Calgary, Alberta T2J 2X2.

First Steps to Mathematics: A Guide for Parents and Teachers to Beginning Mathematics Activities features guidelines and activities built around the mathematical concepts in a child's everyday experiences. It helps parents and teachers understand their distinct but complementary roles in a child's development and includes a list of curriculum objectives cross-referenced with activities as well as a selection of rhymes, fingerplays and simple recipes. There is also a brief annotated bibliography of resources for children, parents and teachers. Cost: \$13. Reference number 96906.

Supermath by Quentin Durham is designed for adolescents who have chronic trouble with basic arithmetic. Practical, hands-on exercises reinforce basic mathematical concepts while teaching geometric techniques and principles. Using common classroom materials, students construct model houses, airplanes and geometric shapes. In addition to a concise section on essential math operations, this 240-page program includes tips for teachers on educational rationale, classroom organization and safety. Supermath is contained in an 8 1/2-by-11-inch binder and is reproducible. Cost: \$40.



Math Activities for Child Involvement, 4th edition, by C.W. Schminke is designed for use with 4- to 16-year-olds. More than 400 activities illustrate topics commonly taught in elementary school mathematics programs. Because special needs children generalize from concrete to abstract, most activities are based on models and are developmentally sequenced within each chapter starting with diagnostic/assessment activities and followed by activities designed to achieve mastery. This 350-page illustrated paperback will meet the needs of teachers preparing individualized education programs, whole-group instruction materials or enrichment activities for academically gifted students. Cost: \$29. Reference number 1363.

Upcoming NCTM Conferences

ANNUAL

April 18 to 21, 1990, Salt Lake City, Utah

REGIONAL

May 10 to 12, 1990, Hamilton, Ontario

October 25 to 27, 1990, Calgary, Alberta

Math Education Month

Every year April is declared Math Education Month. Let's share our ideas and make this coming April a learning experience.

Does your association do anything special during this month? Do you have any ideas about what could be done to focus attention on mathematics during Math Education Month?

Please send me your ideas, and I'll help circulate them among other Canadian math associations.

Mail your suggestions to Michael Cassidy, Canadian Representative, 104 Stillview Avenue, Pointe Claire, Quebec H9R 2X8.

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NCTM Board Approves Project

The NCTM board of directors has approved the establishment of a professional standards commission. By 1991 the commission hopes to disseminate a comprehensive document outlining the standards for teaching mathematics, the professional development of teachers and teaching evaluations. The standards will operate as a companion to the Curriculum and Evaluation Standards for School Mathematics.

Excellence in Mathematics Teaching

Declining student performance, a shortage of qualified mathematics teachers and the public demand for school accountability have forced the commission to address the gap between ideal professional practice and the reality of mathematics instruction today. The commission will strive to outline a set of principles determining what constitutes excellence in mathematics teaching and how it can be evaluated. The commission has compiled a set of conditions describing the environment necessary for teachers to implement the curriculum standards learning and teaching goals in the context of the three teaching standards sections.

Curriculum Standards + Teaching Standards = Professional Standards

Standards for Teaching will focus on how teachers select mathematical content, organize it into instructional units, plan and implement activities that motivate students, monitor and assess students' learning and use classroom data in conjunction with resources to make decisions about instructional alternatives.

Professional Development of Teachers will outline what the Council expects of teachers entering the profession and what it expects of teachers at various stages in their careers. Preservice and inservice professional development will be viewed in terms of mathematical, pedagogical and foundational content, as well as clinical experience.

Standards for the Evaluation of Teaching focuses on evaluating classroom proficiency and continued professional growth. It will delineate the goals, processes and steps of evaluation, and the roles of teachers, peers, students and supervisors. This section will also define the appropriate uses and interpretation of evaluative data.

The commission will consist of a project director and three writers, each of whom will develop one of the new standards components. The commission, along with the NCTM president, president-elect and executive director, will be assisted by a 15-member NCTM advisory group consisting of mathematics teachers, supervisors and evaluators, and teacher educators. This group will outline each component, react to drafts, suggest revisions and conduct hearings on a draft version of the project during 1989-90.



Stump Your Students

The following mathematical problems, submitted by Alvin Baragar (our mathematics representative from the University of Alberta) are designed to challenge bright high school students.

If you get stuck, contact Alvin; he has the answers.

Alberta High School Mathematics Competition

First Round of 1988-89

- 1, The number of integers between $\sqrt[3]{99}$ and $\sqrt{99}$ is
(a) 3 (b) 4 (c) 5 (d) 6 (e) 7
- 2, A box of apples costs \$4, a box of oranges costs \$3 and a box of lemons costs \$2. Eight boxes of fruit cost a total of \$23. Among them, the largest possible number of boxes of apples is
(a) 1 (b) 2 (c) 3 (d) 4 (e) 5
- 3, S is a set of non-congruent right-angled triangles such that each one has area 1 and all the angles of each are a positive whole number of degrees. The maximum number of triangles in S is
(a) 0 (b) 2 (c) 45 (d) 46 (e) unlimited
- 4, Let x and y be real numbers. John computed x^2/y^2 and got 2 as an answer. Mary computed x^3/y^3 and got 3 as an answer. The value of x^5/y^5 must be
(a) 5 (b) $4\sqrt{2}$ (c) 6 (d) $3\sqrt[3]{9}$
(e) impossible to determine
- 5, One solution of $1/x^2 + 1/(2-x)^2 = 40/9$ is $x=1/2$. A different solution is
(a) $-1/2$ (b) $1/4$ (c) $3/2$ (d) 2 (e) none of these
- 6, Of the following five numbers, the largest is
(a) $3^{2^{10}}$ (b) $7^{1^{40}}$ (c) $17^{1^{05}}$ (d) 31^{8^4} (e) 127^{60}
- 7, O is the centre of a regular hexagon of side 1. An equilateral triangle of side 3 is placed so that one of its vertices is at O, but arbitrarily otherwise. The area of the part common to the hexagon and the triangle is
(a) dependent on the actual position of the triangle
(b) $1/6$ (c) $\sqrt{3}/2$ (d) 1 (e) none of these
- 8, The constant term in the expansion of $(2x^3 - 1/x)^{12}$ is
(a) -1760 (b) -220 (c) 220 (d) 1760 (e) none of these
- 9, Arthur rolls a fair cubical die with faces numbered 1, 3, 4, 5, 6 and 8. Betty rolls a fair octahedral die with faces numbered 1, 2, 3, 4, 5, 6, 7 and 8. The probability that Arthur's die-roll is higher than Betty's is
(a) $5/12$ (b) $7/16$ (c) $11/24$ (d) $1/2$ (e) none of these
- 10, ABCD is a 6 by 8 rectangle. Starting from the midpoint of AB, a bug crawls first to some point on AD, then to some point on CD, and finally arrives at the midpoint of BC. The minimum distance the bug must have crawled is
(a) 14 (b) 15 (c) $\sqrt{52} + \sqrt{73}$ (d) 17 (e) none of these



Cipher Breaking

Cipher Breaking was taken from the NCTM News Bulletin, May 1989.

If the message is long enough, one can "break" any cipher that is formed by shifting the alphabet. One does so by observing the frequency with which certain letters are used in a message. The frequency of letter use in the message can be compared with the frequency of letter use in common English. A representative frequency of letter use can be obtained from the Preamble to the Constitution of the United States.

We the people of the United States, in order to form a more perfect union, establish justice, insure domestic tranquility, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this Constitution of the United States of America.

1. To determine the frequency of each letter used, we form a table as shown below. The letters A and B are counted for you.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
三	三																								

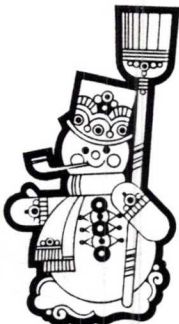
2. By observing the frequency of the letters in the message in number 1, one can compare the frequencies of an unknown cipher and decide how the shift was made. In the enciphered message below, determine the frequency of the letters used by filling in the frequency table in number 2. Place this table for the enciphered message under the table in number 1 and shift it until the frequency patterns "match." They will probably not be exact, but you should be able to locate where the shifted cipher alphabet begins. Remember that the cipher wraps around.

PAR BL TG XEXIATGM ZKTR, ETKZX, TGW PKBGDEXW? UXVTNLX BY AX

PXKX LFTEE, PABMX, TGW KHNGW, AX PHNEW UX TG TLIBKBG

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

3. How large a shift was made? _____
4. What does the message above say? Write the deciphered message directly below the cipher on the lines provided.



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Are You an MCATA Member?

If you wish to renew your membership or if you're joining the Mathematics Council for the first time, please fill out the membership application below.

Membership

- * **Regular:** Members of the ATA as specified in ATA bylaws. All such members are entitled to full privileges of council membership including the rights to vote and to hold office.
- * **Student:** Student members of the ATA may join this council and are entitled to all benefits and services of council membership except the right to hold office.
- * **Affiliate:** Persons who are not ATA members as specified in ATA bylaws. Such members receive all benefits and services of council membership except the rights to vote and to hold office.

Membership Application

Name _____ Teaching Certificate No. _____

Address _____

Postal Code _____ Home Telephone No. _____

School/Employer _____

Grade Level, Specialty _____ Local Name & No. _____

Category of membership in The Alberta Teachers' Association (check one):

Active _____ Associate _____ Student _____

Life _____ Honorary _____

Category of membership in MCATA: New _____ Renewal _____

Membership fee enclosed (check one)

Please make cheque payable to The Alberta Teachers' Association.

Regular \$20 _____ Affiliate \$20 _____

Student \$5 _____ Subscription \$25 _____

Mail membership application to the Mathematics Council, The Alberta Teachers' Association, 11010 142 Street, Edmonton, Alberta T5N 2R1.