DOCUMENT RESUME

ED 236 048 SE 043 390

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TITLE The Status of School Mathematics.
INSTITUTION Indiana State Dept. of Public Instruction, Indianapolis.
SPONS AGENCY Department of Education, Washington, D.C. Basic Skills Improvement Program.
PUB DATE Mar 83
GRANT G008004115
NOTE 76p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS Calculators; *Computers; Educational Research; Elementary Secondary Education; Enrollment; *Mathematics Curriculum; *Mathematics Education; *Mathematics Instruction; *Program Descriptions; State Departments of Education; Surveys; Textbooks
IDENTIFIERS *Indiana

ABSTRACT

This survey provides data on the current status of mathematics programs in Indiana schools. It was intended to stimulate local school systems in the evaluation of their mathematics curricula. Separate sections provide data on elementary schools, junior high and middle schools, and high schools. Included is information on mathematics contests and conferences, computer education, calculators, gifted programs, creative programs, remedial programs, textbook adoption, college and advanced placement courses, enrollment, curriculum, and areas of concern. An appendix contains the survey instruments, completed by contact persons in approximately 763 elementary schools, 114 junior high/middle schools, and 193 high schools. (MNS)

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THE STATUS OF SCHOOL MATHEMATICS

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Indiana Department of Public Instruction
Harold H. Negley, Superintendent

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THE STATUS OF SCHOOL MATHEMATICS IN INDIANA

Indiana Department of Public Instruction
Harold H. Negley, Superintendent
March 1983

Superintendent's Message

In this day and age, surveys are taken for many reasons and to accumulate many types of data. This particular survey has been developed to assist teachers in taking stock of their mathematics curricula to the benefit of their students. As we consider the technological and problem-solving nature of our world today, it is certainly important that we regularly evaluate our efforts in mathematics education with the intent of making our program as sound and as far-reaching as possible.

A primary purpose then, of this compilation of data is to stimulate local school systems in the evaluation of their present mathematics curriculum. A secondary purpose is to learn as much as possible about the current status of school mathematics in Indiana. While it is not presumed that the results presented here are definitively conclusive, it is hoped that they will provide a base and serve as a catalyst for local curriculum committees to develop comprehensive and rich mathematics programs within their school systems. To that end, you are encouraged to consider carefully the information presented and communicate freely with those contact persons who have submitted data on their particular efforts. All of Indiana's school children will profit as a result of this kind of sharing.

Harold H. Negley
Superintendent of Public Instruction

Acknowledgments

Much time and effort has been spent compiling and writing the results of the survey. Appreciation is expressed to the Indiana Council of Teachers of Mathematics; to Dr. Don S. Balka, Saint Mary's College, Notre Dame, Indiana; and to the hundreds of mathematics contact persons in Indiana. Hopefully, the information provided in this monograph presents an accurate description of school mathematics in Indiana and can be used for the betterment of mathematics education in our state.

The contents of this publication were developed under a grant from the Title II: Basic Skills Improvement Program, grant number G008004115, Department of Education.

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Introduction

Through the basic skills efforts of the Division of Reading Effectiveness, Indiana Department of Public Instruction, and in cooperation with the Indiana Council of Teachers of Mathematics, this monograph presents the current status of school mathematics in Indiana. Mathematics educators within the state indicate that this is the first time a survey of school mathematics of such magnitude has been conducted.

As an initial stage of this effort, all school corporations in Indiana had an opportunity to provide the names of three administrators and/or teachers/supervisors to serve as contact persons for elementary, junior high/middle, and high school mathematics. The purpose was to establish a communications network enabling mathematics educators to share programs and gain information about their concerns.

As part of the development of this communication system, separate surveys on the status of school mathematics at the elementary, junior high/middle, and high school levels were sent to the three designated contact persons in school corporations that provided such names. Results presented in this monograph represent approximately 763 elementary schools, 114 junior high/middle schools, and 193 high schools.

Although numerical data provided by respondents were, in many cases, estimates, the statistics presented in the monograph do provide a clearer picture of school mathematics in Indiana. No attempt has been made to compare schools or corporations on the basis of information provided.

Mathematics Guidelines

The Indiana Department of Public Instruction revised the 1969 K-12 Mathematics Guidelines. The product was *Guidelines for Mathematics Instruction in Indiana Schools, 1977*, which is divided into two parts, K-8 and high school.

Objectives for K-8 mathematics are provided for seven major strands — Numbers and Numeration, Operations and Computation, Geometry, Measurement, Problem Solving and Number Sentences, Graphing and Relations, Probability and Statistics — and are accompanied by sample activities for each objective. Tables show approximate grade levels where objectives generally fall.

For high school, objectives are given for each mathematics course listed below:

- Basic Mathematics
- General Mathematics I
- General Mathematics II
- Introductory Algebra I
- Introductory Algebra II
- Algebra I
- Algebra II
- Informal Geometry
- Geometry
- Advanced Mathematics (Unified Course)
- Trigonometry
- College Algebra
- Analytic Geometry
- Business Mathematics
- Consumer Mathematics
- Shop Mathematics
- Probability and Statistics
- Abstract Algebra
- Computer Mathematics
- Calculus

Suggestions for implementing the guide, textbook adoption, curriculum development, and metric conversion are provided in the guidelines. Also, statements are presented on evaluation, providing for individual differences, instructional aids for teaching mathematics, and c.. ulators.

Results of the survey indicate that most corporations have copies of the guidelines, and that these are accessible to elementary, junior high/middle, and high schools within the corporation. For elementary schools, 22 indicated no access to the guidelines (also, 16 no response); for junior high/middle schools, 8 (3 no response); and for high schools, 16 (3 no response).

Copies of the Mathematics Guidelines can be obtained from:

Susan Zimmerman
State Mathematics Consultant
Division of Curriculum
Department of Public Instruction
Room 229, State House
Indianapolis, IN 46204

General Information: Elementary

Elementary surveys were returned by 165 school corporations representing 763 elementary schools, 5,912 teachers, and 291,012 students. A small number of corporations failed to give one or more items of information; the totals reflect only data provided.

The contrast in data for general information is quite striking. Highs and lows are shown in Table 1 below, along with other statistics. Due to several extreme data, the median values probably best reflect Indiana school corporations at the elementary level.

TABLE 1

General Information on Indiana Elementary Schools

	High	*Low*	*Mean*	*Median*	*Mode*
Number of Elementary Schools in Corporation (N = 162)	65	1	5	3	1
Number of Elementary Teachers in Corporation (N = 156)	1500	6	38	47	25
Number of Elementary Students in Corporation	30000	180	1842	1073	1500

The K-6 grade arrangement was predominant in the elementary schools, with 54% of the corporations using this arrangement. Some corporations did have more than one type of grade arrangement. The various grade structures are presented in Table 2.

TABLE 2

Elementary School Grade Structures (N = 178)

Grades	*Number of Corporation*	*%*
K-6	94	52.8
K-5	56	31.5
K-8	9	5.1
1-6	5	2.8
K-4	3	1.7
1-5	3	1.7
6-8	3	1.7
K-3	1	0.6
5-8	1	0.6
K-2	1	0.6
1-8	1	0.6
3-5	1	0.6

Only nine corporations indicated that they have elementary mathematics coordinators; 21 corporations have mathematics specialists in the elementary schools. These teachers are generally responsible for teaching all mathematics in an elementary school.

The demand by society for mathematical competence by students, due to increasing needs by scientific and technological concerns, has and will place an extreme burden on the elementary teacher of mathematics. The National Council of Teachers of Mathematics in "An Agenda for Action" states:

"School boards and school administrations should take all possible means to assure that mathematics programs are staffed by qualified, competent teachers who remain current in their field."

In order to do this, it said, "School systems should maintain well-qualified mathematics specialists or supervisors at all levels to help teachers achieve the professional level specified in these recommendations and to coordinate mathematics education efforts within the system."

Mathematics Contests and Conferences: Elementary

Interest in elementary school mathematics contests, fairs and other special events has been increasing over the last few years as evidenced by articles appearing in *The Arithmetic Teacher*. Results of this survey indicate that Indiana elementary schools are also quite involved.

Mathematics leagues and teams are common in eastern states; the ideas about these have reached our state in both concept and name. Eleven corporations indicated that their elementary schools had mathematics teams, with five corporations actually participating in leagues. The number participating in leagues is misleading since, in general, league activities are a series of contests held throughout the academic year; consequently, many respondents indicated their corporation's participation in leagues under participation in contests. The remaining six corporations indicated that typically their elementary school teams participated in local or county-wide contests. In no corporation was a teacher paid to be an advisor for a school team.

Eleven corporations participate in contests of the Indiana Mathematics League and two participate in contests of the Continental Mathematics League. Other contests (5) were local, district, or county-wide in scope, with emphasis on basic computational skills. Specific contests listed were the Porter County Mathematics Contest, the Twin Lakes Mathematics Competition, and the Southeastern Community School Corporation Contest.

Information provided by the Indiana Mathematics League* and the Continental Mathematics League is presented below.

Indiana Mathematics League
Division of Mathematics Leagues, Inc.
Ed Kennedy, Consultant
1008 Elmhurst Street
Valparaiso, IN 46383

One annual meet is held locally for elementary, junior high/middle, and high school students. Each test consists of 40 multiple choice questions involving any topic appropriate to a particular grade level, with a 30-minute time limit. There is no limit to the number of participants from a school; however, the top five scores for a grade are used as a team score. Tests are graded locally and sent to the league office.

In each participating school, a certificate of merit is awarded to the highest scoring student on each contest entered. County, regional and national awards are also given. The cost is $12 for each grade entered.

Continental Mathematics League
Box 306
Hauppauge, NY 11788

The Continental Mathematics League is organized and operated by a group of mathematics educators whose teaching experience ranges from elementary school through college.

Meets are divided into five levels: grade 4, grades 5-6, grades 7-8, grade 9, and the calculus. In 1981-82, five meets for levels 4-9 were scheduled. Each meet is held locally and consists of six questions, with each student working independently for 20 minutes. There is no limit to the number of participants from a school; however, the top six scores are used as a team score. Tests are graded locally and sent to the league office.

Each team for a level receives two medals and five certificates. There are also regional and national awards. The cost is $30 for one team on any level (4-9), plus $20 for any additional team on the same or other levels.

*Note: The information provided has been summarized from the junior high/middle school contest information, and may not be the same for elementary and high school contests.

Calculator and computer contests were few in number. The calculator tournament sponsored by Indiana University Northwest and the Northwest Indiana Council of Teachers of Mathematics is one of the largest tournaments in the state. Students compete in one of four categories:

Category 1: Grades 5 and 6
Topics: Arithmetic of rational numbers, simple geometric concepts, appropriate applications
Category 2: Grades 7 and 8
Topics: Pre-algebra concepts
Category 3: Grades 9 and 10
Topics: Algebra and Geometry
Category 4: Grades 11 and 12
Topics: Advanced Mathematics

Students work individually to solve as many of the problems as they can in a 45-minute time period. Problems focus on the student's ability to (a) use his/her machine to compute, (b) use the machine to solve typical application problems appropriate for the grade level, and (c) use the machine as an aid in solving problems that require his/her knowledge of the limitations and possibilities of the calculator.

Team and individual awards are provided. Schools may enroll four students per school in each of the categories 1 and 2, and three contestants each in categories 3 and 4.

Further information can be obtained from:

Dr. Clyde Wiles
Indiana University Northwest
3400 Broadway
Gary, IN 46408

The only other named tournament was the Dunelands Invitational.

Eleven corporations indicated that their elementary schools sponsored math fairs; some of these were in conjunction with local science fairs. A variety of special mathematics events at the elementary school level were reported on surveys and are listed below. A description of the St. Jude Math-A-Thon is also provided.

St. Jude Math-A-Thon
Ciphering Contest
General Math Contest
Calculator Club
Metric Fair
Logic Games
Math Olympics
Scholarama
Calumet Regional Science Fair
National League of Mathematics Contest

St. Jude Math-A-Thon
Central Regional Office
136 E. Main Street
New Albany, IN 47150

The Math-A-Thon has been designed to encourage and create interest in mathematics among students and to raise funds needed to continue work at St. Jude Childrens' Research Hospital in Memphis, Tennessee.

There are a total of eight math fun books, one for each grade level, one through eight. Each book contains 200 math problems that are in the form of tangle tables, puzzles, cartoons, and codes. Participating students solicit sponsors to pledge money for each problem correctly answered.

The parents of each student receive an answer sheet to all the problems in a particular book, and are encouraged to aid their children.

St. Jude Childrens' Research Hospital provides the following awards: Math-A-Thon certificate for all participants, T-shirt for students collecting $25 or more, and a jacket and T-shirt for students collecting $100 or more.

Computer Education: Elementary

The National Council of Teachers of Mathematics states, ". . . it is imperative that schools play an active part in preparing students of the 1980s to live in a world in which more and more functions are being performed by computers." Based on the results of this survey, it is evident that Indiana elementary schools are striving to meet the demand for computer education.

There was difficulty in interpreting the responses given by elementary school contact persons regarding computers. Decisions had to be made as to whether or not elementary schools actually had access to and made use of computers. Of the 169 surveys tabulated, 67 (39.6%) indicated that they had computers for educational use in elementary schools.

The types of computers currently used are listed below in Table 3. References on the surveys to computers used at the secondary level are not included in the tabulation.

Computer literacy through instruction and awareness were the responses given by most contact persons in listing the purposes of computer use. Responses are categorized in Table 4.

TABLE 3

Types of Computers in Use

Type	*Number of Corporations*
Radio Shack TRS-80	28
Apple	24
Pet	9
Hewlett Packard	1
Texas Instruments	1
PRIME Time Sharing	1
VIC — 20	1
Time Sharing (Vincennes University)	1
Micro Time Sharing	1

TABLE 4

Computer Use

Purpose	*Number of Corporations*
Instruction; Awareness	34
Drill	6
Enrichment; Extended Learning	6
Computer Assisted Instruction	5
Remediation	3
Independent Study	3
Gifted and Talented	3
Problem Solving; Math	3
CAPPS Testing	1

Provisions for computer instruction were predominantly in the hands of elementary classroom teachers (69.7%). Independent study through programmed texts, self-paced booklets, tapes, and a commercial program called "Computeronics" accounted for 16.3% of instruction. Other sources of instruction were a gifted and talented program teacher and coordinator, a librarian, and a computer coordinator. One corporation does provide a special summer session for elementary students.

As expected, BASIC (Beginners All-purpose Symbolic Instructional Code) was the computer language used by most elementary schools with computers. PASCAL was available in two corporations. Although COBOL and FORTRAN were listed, it is the investigator's belief that these languages were used only at the high school level. The PILOT program was operational in one corporation.

The number of terminals in a corporation for elementary school use varied from 1 to 80, with most corporations having 1 to 6 terminals per school.

Seven corporations indicated that they have computer literacy statements; however, only one corporation attached such a statement. The complementary philosophy of computer education is comprehensive for grades K-12. Other computer literacy statements for secondary schools are presented in appropriate sections of this monograph.

Metropolitan School District of Washington Township
Indianapolis

A Philosophy of Computer Education

The influence of computers on human life and on the future development of our planet will continue to increase exponentially in the years ahead. All students should be educated to respond positively and productively to this growing influence. Computer literacy, therefore, is an essential outcome of contemporary education. It is essential that our educational system be modified in such a way that students begin learning about and interacting with computers from the time they first enter school. The use of computers as both objects and instruments of learning, should be thoroughly integrated into the school program. As students progress from kindergarten to grade 12, they need to study:

- the history of computing
- the versatility and limitations of computers
- the impact of computers on society
- computer interaction and operation
- computer-related problem-solving, decision-making, and programming skills
- areas not yet envisioned

The transforming effect which computers will continue to have on society will logically and directly impact on our educational practices. The study of computers and computing does not run counter to the spirit of human endeavor or to the exercise of free, creative intelligence! Rather, it tends to extend and deepen these qualities by expanding the power of the human mind. As such, computer education will foster a much-needed dimension of our intelligence.

Elementary School Computer Literacy Goals

Goal: The student will become aware of the historical background and development of computers.
Goal: The student will describe characteristics, uses, benefits, and limitations of computers.
Goal: The student will examine the current and projected impact of computer technology on society.
Goal: The student will learn to interact with a computer and will acquire a non-technical understanding of how a computer works.
Goal: The student will develop problem-solving, decision-making, and simple programming skills through interaction with computers.

Calculators: Elementary Schools

Although lower-priced models of calculators for elementary classroom use have been available for almost 10 years, results of this survey would appear to indicate that, in general, elementary schools are still not using calculators as many mathematics educators had expected.

The National Council of Teachers of Mathematics, in its "Agenda for Action: Recommendations for School Mathematics in the 1980s" states:

"Calculators should be available for appropriate use in all mathematics classrooms, and instructional objectives should include the ability to determine sensible and appropriate uses.

Calculators and computers should be used in imaginative ways for exploring, discovering, and developing mathematical concepts and not merely for checking computational values or for drill and practice."

Table 5 presents data on the use of calculators in elementary school mathematics classes. The percentage of use is comparable to the results of other similar surveys.

TABLE 5

Calculator Use in Elementary Mathematics Classes

Response	*Number of Corporations*	*%*
Yes	78	47.3
Sometimes	35	21.2
No	52	31.5

Even with the low price of suitable calculators, school corporations find that the purchase of calculators in small quantities or in classroom sets is expensive. Out of 159 responses, only 74 (46.5%) elementary school contact persons indicated that their corporations owned calculators for student use. Information about the number of corporation-owned calculators was lacking on many surveys. The mean number of calculators for those corporations that did report was 91.4; however, this statistic is very misleading since the range went from 2 calculators to 2,000 calculators. The median number of calculators owned was 27.5, while the mode was 30. These statistics would seem to indicate that corporations basically own one classroom set of calculators for elementary schools.

The types of corporation-owned calculators were quite varied, but some model of a Texas Instrument calculator was, by far, the most popular. Table 6 presents a list of those reported.

TABLE 6

Types of Corporation-Owned Calculators

Type	*Number of Corporations*
Texas Instruments	24
Sharp	9
Casio	5
National Semiconductor	3
Rockwell	1
Radio Shack	1
*Preprogrammed "Calculators"	11

*In general, preprogrammed "calculators" are not calculators, but merely instructional aids for practicing basic computational skills. Machines such as Data Man, Little Professor, Quiz Kid, Math-O, and Digitor are in this category.

Ranked below are various categories given for the purpose of calculator usage in elementary mathematics classes. They are typical of those found in other studies.

Instruction and familiarization with calculators
Checking work
Skill development: estimation; drill

Enrichment; extension
Problem solving
Remediation; Title I
Program support; unit of curriculum
Contests
Games

Only seven corporations reported that they have written policies regarding the use of calculators in the classroom. Those included with completed surveys are presented below as models for corporations to use in adopting their own policy statements.

Northwest Allen County Schools
13119 Coldwater Road
Fort Wayne, IN 46825

Calculators in the Classroom

Calculators are here to stay. They may change form, but they will not go away. They are not a fad that will disappear when the American public becomes bored with them.

The "handheld" calculator is relatively inexpensive, very powerful, and must be considered in connection with our mathematics curriculum. Although many questions remain unanswered about the potential of using calculators in the classroom, the Mathematics Curriculum Committee supports their use and proposes the following guidelines:

1. Teachers shall insist on the memorization of addition, subtraction, multiplication, and division facts. However, in the case in which a student has difficulty in mastering these facts, the calculator may be used as a motivational and teaching device.
2. Teachers can have students check answers to homework assignments. Problems worked incorrectly should be corrected by the student.
3. Teachers can use the calculator as a motivational tool. They encourage curiosity, positive attitudes, and independence.
4. Teachers can use the calculator to encourage discovery, exploration, and creativity.
5. Teachers can use the calculator to aid in the solution of story problems. Problems can be more realistic and the scope of story problems can be enlarged.
6. Teachers must be careful not to create a false impression that mathematics may be equated with computation, performed without thinking. The emphasis cannot be placed only on the answer, but equally on the process. Mental laziness and too much dependence on the calculator must be discouraged.
7. Teachers must stress estimation and mental arithmetic when calculators are used, especially when they are used for complex computations. It is important that students be able to estimate the answer, to judge whether the result makes sense.

In conclusion, calculators are becoming a regular part of the daily lives of many people. The mathematics classroom is the logical place to prepare competent people in their use. The use of calculators and experimentation with calculators in the classroom is encouraged within the guidelines presented.

Marion Community Schools
121 East River Boulevard
Marion, IN 46952

Use of Calculators

Because of low price and versatility, calculators are becoming a common tool at home and at work. With the extensive availability of calculators in society, teachers must begin to explore the place of calculators in teaching mathematics in the elementary school. The National Council of Teachers of Mathematics (NCTM) has gone on record endorsing the use of calculators in schools. The question is no longer whether calculators should be used in schools but how. Facility in calculator use will be an important success component in tomorrow's world.

This year, with new textbooks and a problem-solving focus, the Marion Schools are making great advances in structuring meaningful mathematical experiences for students. This work will form a base for further curricular development in subsequent years. In a few years, calculators may be an integral part of instruction.

Calculators can be useful in helping pupils learn to solve problems. The major task in solving problems is deciding on the approach and then setting up the problem. With the availability of a calculator, pupils can focus on these important steps rather than on computing the answer. Research by Dr. Grayson H. Wheatley at Purdue University has shown that when armed with a calculator, pupils will tackle problems they would not attempt otherwise. Calculators can be used to help pupils utilize higher level thinking skills by carrying the burden of lower level computation.

This shift in the level of thinking parallels the changes in the nature of work in society; lower level skills are being eliminated and being replaced with jobs requiring higher level thought, e.g., problem solving.

You are encouraged to explore the use of calculators in teaching mathematics to your students. Remember that a calculator can be a useful tool and need not short-circuit learning of basic skills. With the use of calculators, it may be possible for pupils to do *more* thinking.

Portage Township Schools
5894 Central Avenue
Portage, In 46368

Math Goals

The student will:

5. Be introduced to the functions of a basic calculator. (Program Goals K-5)

The student will:

7. Select and use support technology such as calculators, computers and slide rules in the solution of mathematical problems and problems which require mathematical solutions. (Goals K-12)

Gifted Programs: Elementary

With increased attention being paid to developing the potential of the gifted student, several programs have been developed in Indiana for these students. Some cover all subject areas, while others are specific to mathematics. Programs range from accelerated classes and enrichment classes to complete programs for the gifted. According to survey results, 52 corporations provide special programs for the gifted. Programs listed on the surveys are presented below. Where possible, a contact person and a description of the program is also given.

Acres of Diamonds Talented and Gifted Program, K-5
Portage Township Schools
Dr. Imogene Jones, Director
5894 Central Avenue
Portage, IN 46368

The program develops a wide spectrum of talents through specific teaching/learning strategies and resources used in: (1) Talented and Gifted (TAG) classroom activities, (2) Classroom Challenge Centers, (3) Creative Writing Pullout Program, and (4) Independent Study.

Horizons, K-8
Evansville-Vanderburgh School Corporation
Ronna Rachelson, Coordinator
1 S.E. 9th Street
Evansville, IN 47708

The Horizon program contains two major components. One is the development of enrichment and/or pull-out programs within each individual school to meet the needs of its students. The other component represents corporation-wide mentor experiences which take place off-campus.

Instructional units have been developed for use with gifted students in a wide range of areas from Genetics to Shakespearean Literature. The off-campus mentor program includes a program in computers.

Programming Exceptional Potential, 1-6 (PEP)
Metropolitan School District of Washington Township
1605 East 86th Street
Indianapolis, IN 46240

Extended Learning Opportunities Program, 4-12
Madison Consolidated Schools
Box 445
Madison, IN 47250

The guiding characteristic of the Extended Learning Opportunities Program is to provide the gifted with opportunities for extended learning through involvement in independent study, individual and/or small group projects, and community resources.

Students of Exceptional Abilities
South Newton School Corporation
110 N. Third Street
Kentland, IN 47951

The program is based on the systematic process approach of the Three Stage Model developed by the Purdue Gifted Education Resource Institute. Stage I activities develop basic thinking skills, both convergent and divergent. Stage II activities allow students to apply thinking skills to the realm of creative problem solving. Stage III introduces students to independent project activities while further practice in creative thinking and problem solving is never abandoned.

Program for Academic and Creative Enrichment, 3-6 (PACE)
Penny Britton Kolloff
Tippecanoe School Corporation
21 Elston Road
Lafayette, IN 47905

The major purpose of the program is to help the children develop their thinking skills, their creative problem-solving skills, and their independent learning skills. To facilitate this development, children meet twice a week in small groups (7-9 students) with the guidance of a trained resource teacher. During these meetings, the children participate in activities which are designed to develop these skills.

Talented and Gifted Program
Diane Borgmann
Van Buren Elementary School
225 Shaw Street
Plainfield, IN 46168

The program is a pull-out program for students in grades K-6. Each student spends between three and five hours per week in a resource room. Areas of study are: computers, foreign language, creative thinking, future problem-solving program, special projects, creative writing, junior great books, and Continental Math League. Non-academic classes are also offered in oil painting, cartooning, and much composition.

Ball State Institute for the Gifted in Mathematics (BIG M)
Rebecca S. Nelson or Karen D. McBride
Department of Mathematical Sciences
Ball State University
Muncie, IN 47306

BIG M is a one-week residential experience for the gifted elementary student, grades 4-6. It is designed to provide mathematics enrichment activities not normally found in the classroom and to expose gifted students to math-related careers. Some of the topics explored during the week include patterns in mathematics, problem solving, logic and reasoning, visual perception, suitable topics from geometry, computer programming and graphics. Participants are selected on the basis of scores on a battery of screening tests. The total cost for the program including board, room, recreation, etc., is $185.

Conceptually Oriented Mathematics Program (COMP)
See page for a fuller description of COMP.

Additional programs and contact persons are listed below.

Math Their Way
Elementary Curriculum Coordinator
Metropolitan School District of Washington Township
3801 E. 79th Street
Indianapolis, IN 46240

PAGE
Michael A. Garis
Eagle-Union Community Schools
North 6th Street
Zionsville, IN 46077

SPICE I and II
T.R. Ellis, Principal
Central Elementary School
Lawrenceburg, IN 47025

Special Enrichment and Resources Classroom Help (SEARCH)
Larry Yeakley, Principal
Eastlawn Elementary School
R.R. #1
Burnettsville, IN 47926

Global Futures Center
Gail Wickersham
Burris Lab School
Ball State University
Muncie, IN 47306

Adventurer's Club
Roy J. Nehl, Principal
Western Elementary School
600 West 250 South
Russiaville, IN 46979

Project UP
Roger Norris, Principal
Cumberland Road Elementary School
R.R. #5, Box 280-B
Noblesville, IN 46060

Challenge Program
M. Keirn Kile, Principal
Royerton Elementary School
R.R. #1
Muncie, IN 47302

Mentor Program
Katie Tunis
Coordinator for Elementary Education
Metropolitan School District of Southwest Allen County
4510 Homestead Road
Fort Wayne, IN 46804

Advanced mathematics projects, after school classes, computer classes, summer program, middle school program, Milliken math, acceleration, and enrichment are other listed programs.

Mathematics educators suggest that programs for the gifted in mathematics should not be strictly acceleration, but rather sequential in nature, with many types of problem-solving activities in mathematics being developed.

The Indiana Department of Public Instruction has been responsive to the needs of schools to provide information on programs for the gifted and talented. In 1982, a conference on the college and university role in providing for talented students was held in Indianapolis. The focus of the conference was on the Midwest Talent Search, a program to identify sixth, seventh, and eighth grade students who show high potential for achievement verbally or mathematically.

New and/or Creative Programs: Elementary

Throughout the state, new and/or creative mathematics programs for the elementary level abound, with 39 corporations indicating a program in existence. A major problem is, and has been, the lack of dissemination of information about these programs. Conferences funded through Title IV-C have provided information on a few successful programs, but, in general, only funded programs are included.

In the listing which follows, contact persons for specifically named programs are given, if available. Where possible, a brief outline of the program is also provided.

Conceptually Oriented Mathematics Program (COMP)
COMP Consultants, Inc.
1414 I-70 Drive, S.W.
Columbia, MO 65201

A. Comprehensive management system, K-8
B. Behavioral objectives serve as curriculum guide, packaged into eight teacher's guidebooks
C. Post tests to evaluate degree of mastery at each level
    1. Two forms for each level 7-25
    2. One form for each level 1-6
D. Pupil's individual record (profile sheet)
E. Horizontal enrichment
F. Placement tests for levels 1-25
G. Guidebooks contain the following:
    1. Overview of COMP
    2. Suggestions for starting placement tests
    3. Scope and sequence chart
    4. Table of contents
    5. Lesson plan for each objective
    6. Worksheets and answers
    7. Answers for Post Test I and II
    8. Cross references to 5 major textbook series

Math Skills Improvement Program, K-8
Baugo Community Schools
Gerald Heindselman, Director
59023 CR-3 S
Elkhart, IN 46517

A. Performance objective for nine mathematics strands:
   Numeration, Sets, Order, Addition, Subtraction, Multiplication, Division, Measurement, Geometry
B. Scope and sequence chart
C. Pupil mastery math skills cards
D. 80% mastery on unit end tests and criterion referenced tests
E. 95% mastery on basic computational skills
F. Exposure objectives

Math-Medic
New Prairie United Corporation
Box 218
Rolling Prairie, IN 46371

U-Sail Math Program
Patricia Ragsdale, Principal
Blue River Valley Elementary School
Box 187
Mount Summit, IN 47361

Success in Mathematics through Aural Reading Techniques (SMART)
Pam Meier
Talented and Gifted Director
Linton-Stockton Elementary School
R.R. #2, Box 132
Linton, IN 47441

STAMM
G. W. Anderson, Assistant Superintendent
Blackford County School Corporation
214 S. High Street
Hartford, IN 47348

Computeronics
Larry J. Paxson
Director of Elementary Education
Jay County School Corporation
Box 1239
Portland, IN 47371

Self-Paced Math
Tom Smith, Principal
North Harrison Elementary School
Ramsey, IN 47166

Calculator/Problem Solving (through Purdue University)
Jeff Russow
Vinton School
3101 Elmwood Avenue
Lafayette, IN 47904

Other programs funded by Title IV-C funds have been:

Teacher-written management system
Mathematics curriculum guide for basal program
K-12 criterion referenced tests
Prescription-diagnostic approach
Fingermath
Calculator and computer class
Ginn Individualized program
D.C. Heath Math program
Mathematics kits and math labs
Traditional program; teaching basic facts

Remedial Programs: Elementary

Remedial programs in mathematics are widespread in Indiana. Seventy-nine corporations reported that they have some type of remedial program, with 35.4% of these being Title I programs. Other remediation programs or assistance are listed below:

Summer school
Learning disability program
Tutorial, peer, parent or paid aide
COMP Program
Borg-Warner System 80
Tapes
Individual achievement levels for students
Basic math program
Teacher-developed program
Resource room
Selected 5th and 6th grade students

Textbook Adoption: Elementary

In Indiana, mathematics textbooks are now adopted every six years. The Commission on Textbook Adoptions selects up to seven programs to be used in the instruction of a particular course that has been approved by the Commission on General Education. A corporation then selects one program from this list for use by students in its system. The statistics which follow are based on adoptions for the 1980-81 academic year, and are taken from the Textbook Adoption Report (7-28-81). Many corporations have multiple or split textbook adoptions in the elementary schools; hence, the totals for each category are not equal.

Category 1: Basal Math	Grade 1	N = 312
Publisher	*Number of Corporations*	*%*
1. D.C. Heath	187	59.9
2. Scott Foresman	46	14.7
3. Houghton Mifflin	38	12.2
4. Addison-Wesley	20	6.4
5. Holt, Rinehart, and Winston	15	4.8
6. Harcourt Brace Jovanovich	4	1.3
7. MacMillan	1	0.3
* Not offered	1	0.3

Category 2: Basal Math	Grade 2	N = 310
Publisher	*Number of Corporations*	*%*
1. D.C. Heath	188	60.6
2. Scott Foresman	47	15.2
3. Houghton Mifflin	37	11.9
4. Addison-Wesley	19	6.1
5. Holt, Rinehart, and Winston	14	4.5
6. Harcourt Brace Jovanovich	2	0.6
7. MacMillan	2	0.6
* Not offered	1	0.3

Category 3: Basal Math	Grade 3	N = 315
Publisher	*Number of Corporations*	*%*
1. D.C. Heath	193	61.3
2. Scott Foresman	46	14.6
3. Houghton Mifflin	35	11.1
4. Addison-Wesley	20	6.3
5. Holt, Rinehart, and Winston	13	4.1
6. Harcourt Brace Jovanovich	6	1.9
7. MacMillan	1	0.3
* Not offered	1	0.3

Category 4: Basal Math	Grade 4	N = 317
Publisher	*Number of Corporations*	*%*
1. D.C. Heath	194	61.2
2. Scott Foresman	47	14.8
3. Houghton Mifflin	34	10.7
4. Addison-Wesley	20	6.3
5. Holt, Rinehart, and Winston	13	4.1
6. Harcourt Brace Jovanovich	6	1.9
7. MacMillan	1	0.3
* Not offered	2	0.6

Category 5: Basal Math

Grade 5

N = 312

Publisher	*Number of Corporations*	%
1. D.C. Heath	182	58.3
2. Scott Foresman	48	15.4
3. Houghton Mifflin	37	11.9
4. Addison-Wesley	22	7.1
5. Holt, Rinehart, and Winston	14	4.5
6. Harcourt Brace Jovanovich	7	2.2
7. MacMillan	1	0.3
* Not offered	1	0.3

Category 24: Mathematics Special Needs Grades 1-6

N = 315

Publisher	*Number of Corporations*	%
1. Benefic Press	6	1.9
1. Laidlaw Brothers	6	1.9
3. Fearon Pitman	4	1.3
4. Bowmar Noble	3	1.0
4. William H. Sadlier	3	1.0
6. Webster Div., McGraw Hill	2	0.6
6. Scholastic Magazine	2	0.6
* Not offered	289	91.7

Areas of Concern: Elementary School

Several suggestions and concerns were listed by elementary school contact persons. Responses to many of the concerns are in this monograph, marked below with an asterisk (*). An attempt has been made to categorize and rank the major concerns.

I. Computer Education and Computers
   - A. Computer training programs for teachers
   - B. Software review
   - *C. Computer literacy

II. Mathematics Programs
   - *A. Gifted and Talented programs
   - B. Funding for programs
   - C. Remedial math programs
   - *D. New programs that are successful; contact person

*III. Mathematics Contests and Conferences
   - A. Math Bee
   - B. Math Fair
   - C. Preview test items for local contests

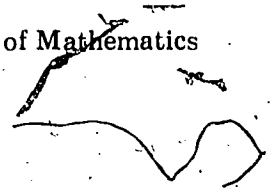
IV. Calculators
   - A. Calculator usage in the classroom
   - B. Calculator programs
   - *C. Calculator usage policy

V. Evaluation
   - A. Testing; remediation
   - B. Prediction of success in high school mathematics after grade 6
   - C. Mastery learning philosophy
   - D. Discrepancy between mathematics requirements and achievement tests

VI. Curriculum
   - A. Learning centers
   - B. Curriculum development
   - C. Public school curriculum grade by grade
   - D. Problem-solving material

VII. Mathematics Manipulatives
   - A. Supply by state
   - B. Use of manipulatives

*VIII. Indiana Council of Teachers of Mathematics



General Information: Junior High/Middle School

Junior high/middle school surveys were returned by 60 school corporations representing 114 schools, 50,732 students, and 262 mathematics teachers. Much of the information on junior high/middle schools has been provided on either elementary or high school surveys, depending on the grade structure for a corporation. A small number of corporations failed to give one or more items of information; the totals reflect only data provided.

Statistics for general information are shown in Table 7 below:

TABLE 7

General Information on Indiana Junior High/Middle Schools

	High	*Low*	*Mean*	*Median*	*Mode*
Number of Junior High/ Middle Schools in Corporation (N = 52)	24	1	-	-	-
Number of Junior High/ Middle School Students in Corporation (N = 58)	9,000	125	874	450	280; 400
Number of Junior High/ Middle School Math Specialists in Corporation (N = 47)	33	0	-	-	-
Number of Junior High/ Middle School Math Classes in Corporation (N = 57)	350	3	32.6	18	6

The grade arrangement for junior high/middle schools was quite varied. Again, it must be noted that many grade arrangements were included on elementary or high school surveys. The grade structures are presented in Table 8.

TABLE 8

Junior High/Middle School Grade Structures

Grades	*Number of Corporations*
7 - 8	30
6 - 8	22
7 - 9	9
7 - 12	4
K - 8	3
7 - 8	2
6 - 7	1
8 - 9	1
4 - 8	1
K - 12	1

The size of regular junior high/middle school classes ranged from 11 to 33 students, with a mean of 25.7, a median of 25, and a mode of 25. Remedial classes had a range from 4 to 26, with a mean of 16.2, a median of 18, and a mode of 20; honors classes ranged in size from 10 to 35, with a mean of 25.4, a median of 25, and a mode of 25.

Only eleven corporations reported having a junior high/middle school mathematics coordinator. As was the case with high schools, often this coordinator is a department chairperson, principal, or assis-

tant superintendent for instruction. The number is also misleading due to the number of corporations having combined junior-senior high schools.

The shortage of qualified mathematics teachers is more critical at the junior high/middle school level than that reported at the high school level. Positions were being filled by substitutes not trained in mathematics, elementary teachers with additional mathematics training, and certified but low-ability teachers. Teachers trained in mathematics were, in general, not teaching mathematics at the junior high level.

Mathematics Contests and Conferences
Junior High/Middle Schools

Participation in mathematics contests and conferences is similar to that of elementary schools. Students were involved in contests described in the other sections of the monograph.

Only four schools indicated that they did have a mathematics team, with three participating in a mathematics league. The Sigma Math League was the only league listed; however, the Continental Math League and the Indiana Math League have been described earlier.

Contests cited on the surveys are listed below:

Marion County Math Day
Indiana Math League
Chesterton Invitational
Adams County Math Contest
Continental Math League
St. Mary's of the Woods
Oakland City College Algebra Contest
Adams Central Math Invitational
Brookdale Junior High Contest (Elkhart)
Indiana University-Northwest Calculator Tournament
Brebeuf Contest (Indianapolis)
Local Contests

Responses do not indicate whether the above contests are strictly for junior high/middle school students. Four corporations indicated participation in computer contests. Again, it is not clear whether these contests are only for junior high school students.

The Brebeuf Math Contest is for seventh grade students from approximately 30 schools throughout Marion County. The top three schools (3 students per school) and top 10 individuals are awarded trophies and certificates for their performances. The multiple-choice test consists of 70 one-point questions, 20 two-point questions, and 10 three-point questions. Students have one hour to complete the test. For further information, contact:

Thomas L. Fialkowski
Brebeuf Preparatory School
2801 West 86th Street
Indianapolis, IN 46268

Twelve corporations have mathematics clubs in the junior high, one being a club for remedial mathematics.

A revival of the state mathematics contest was favored by 24 responding corporations.

Special mathematics events included the Indiana University School of Mathematics Test, a one-week summer program at Hanover College, the Mathematics Division of the Calumet Regional Science Fair, and a program sponsored by the Wilson Educational Center, Jeffersonville.

Computer Education: Junior High/Middle Schools

In its "Agenda for Action," the National Council of Teachers of Mathematics suggests that "schools play an active part in preparing students of the 1980s to live in a world in which more and more functions are being performed by computers." Their recommendation is that a computer literacy course be developed for both junior and senior high school students. Thirty-nine corporations reported having a computer for student use in junior high/middle schools, with 23 corporations offering computer courses of some type. The Radio Shack TRS-80 is the most popular, followed by Apple and the Commodore PET. Others listed were Digital and Burroughs.

The BASIC programming language was the predominant language taught, although FORTRAN and COBOL were also listed. It is not apparent whether or not these two languages were actually taught in junior high schools.

Purposes of computer use are presented in Table 9.

TABLE 9

Computer Use

Purpose	*Number of Corporations*
Instruction; Awareness	25
Remediation	6
Enrichment	3
Gifted and Talented	2
Drill; Tutoring; CAI	6
Games	2

Scottsburg Junior High School provided the following computer literacy statement and six-week computer literacy course outline. Other statements are found in the elementary and high school sections of this monograph.

Computer Literacy

Computer literacy means more than just knowing computer terminology and history. In addition to computer awareness, computer literacy implies some level of programming ability on the part of the students, thus enabling them to control the computer instead of only being able to respond to it.

Six-Week Computer Literacy Course

Texts: *Computeronics: Problem Solving with Computers* and Activity Packet
Computeronics: Computer view and Activity Packet

Session 1: Introduce students to *Computeronics:* format, materials, management, etc.
Session 2: Administer pretest to assess entering skills. Divide class into groups A and B.
Session 3: Both student groups A and B read and complete Chapter 1 in PSWC.
Session 4: Group A begins Chapter 2 in PSWC. B reads "Students visit a Computer Center."
Session 5: A completes mastery for Chapter 2. B completes "Hardware" Crossword Puzzle and mastery for hardware.
Session 6: Plan a field trip to a computer center if possible. If not, go on to Session 7.
Session 7: Repeat Session 4 but switch groups.
Session 8: Repeat Session 5 but switch groups.
Session 9: A begins Chapter 3. B reads "A Future Career" article, discusses careers.
Session 10: A completes activities and mastery for Chapter 3. B completes "Scrambled Careers" activity and mastery for careers.
Session 11: Repeat Session 9 but switch groups.
Session 12: Repeat Session 10 but switch groups.
Session 13: A begins Chapter 4. B begins to read the six articles about computer uses in society.
Session 14: A completes Chapter 4 activities. Group B completes "Uses in Society Word Scramble."
Session 15: A completes mastery activities for Chapter 4. B completes mastery for uses in society.

Session 16: Repeat Session 13 but switch groups.
Session 17: Repeat Session 14 but switch groups.
Session 18: Repeat Session 15 but switch groups.
Session 19: A begins Chapter 5. B reads "Editorial" and "Letters to the Editor." They discuss effects.
Session 20: A continues in Chapter 5. B reads "Computer 2050" about uses in the future.
Session 21: A completes mastery for Chapter 5. B completes mastery for "Letters" and "Computers 2050."
Session 22: Repeat Session 19 but switch groups.
Session 23: Repeat Session 20 but switch groups.
Session 24: Repeat Session 21 but switch groups.
Session 25: A begins Chapter 6. B reads "History of Computers."
Session 26: A completes Chapter 6. B completes "History" Crossword Puzzle and mastery activity for "History of Computers."
Session 27: Repeat Session 25 but switch groups.
Session 28: Repeat Session 26 but switch groups.
Session 29: Students may complete any practice or mastery activity or do computer sidetrips.
Session 30: Administer the post-test to assess the amount of learning which occurred.

Calculators: Junior High/Middle Schools

Calculator use in junior high/middle schools is more restricted than in either elementary or high schools. Only 26 corporations indicated that calculators were used in mathematics classes, with 13 corporations indicating sporadic use.

Thirty-seven corporations indicated that they own calculators for student use. Of the 35 corporations indicating the number of corporation-owned calculators, the mean was 37, with a median and mode both 30. As results from the elementary survey suggested, it appears that junior high/middle schools have one classroom set of calculators.

Texas Instruments calculators are the most widely used type of calculator. Similar to the high school results, the TI-30 is the most popular model. Table 10 lists other types reported.

TABLE 10

Types of Corporation-Owned Calculators

Type	*Number of Corporations*
Texas Instruments	22
Sharp	6
Casio	3
Panasonic	2
Radio Shack	1
National Semiconductor (NSC)	1

In the junior high/middle school, many corporations indicated that calculator units were taught as part of the regular mathematics curriculum. Problem solving and checking homework were cited as other uses of the calculator. Class use was not restricted to mathematics, but also included science and gifted programs.

Written corporation policies for calculator use in the junior high are uncommon, although comprehensive K-8 or K-12 policies have been presented in other sections of the monograph. Cascade Junior High School in the Mill Creek Community School Corporation provides a concise statement as to the mathematical use of calculators:

> "To use hand-held calculators in the classroom for reinforcing computational skills, improving estimation of results, aiding in teaching place value, developing number concepts, stimulating interest through games, solving problems with factual data, checking answers to computation, drilling on arithmetic 'facts' (alternative to flash cards), and extending problems in the text to use larger or more realistic numbers."

Gifted Programs: Junior High/Middle Schools

Programs for the gifted and talented were reported by 32 corporations. Sixteen of these, however, consisted only of teaching Algebra I in the eighth grade. Others included geometry in Grade 9, pre-algebra in Grade 7 and 8, and accelerated mathematics programs. The COMP program described in the elementary section was the only program listed.

New and/or creative programs included computer courses for junior high students, advanced computer programming, audio math, the SMART program, the STAMM program, the COMP program (See elementary section, p. , for contact.)

Junior high/middle school students were able to take mathematics courses of some type at Vincennes University, Indiana University-Purdue University at Fort Wayne, and the University of Cincinnati.

Twenty-four corporations indicated that Algebra I was offered for eighth grade students, with some sixth and seventh grade students also taking the course. The most widely listed selection procedure was by teacher recommendation, although the following were also listed:

Grade of A in 7th grade mathematics
Scores on achievement tests, such as the Iowa Test of Basic Skills
Algebra prognostic test
Intelligence test score
Parental approval

Only six corporations reported offering geometry for eighth grade students. Selection procedures were similar to those for Algebra I.

Students in grades four through eight are eligible for the Special Abilities Program (IPSAP) offered by Indiana University-Purdue University at Fort Wayne. Students who are accepted into the program are enrolled in two courses that meet on six Saturdays. The fee is $45, with microcomputer courses having an additional $8 fee. Courses are offered in mathematics, future problem solving, and computers. Information can be obtained from:

Dr. M. Ann Dirkes
Associate Professor of Education
240 Neff Hall
IPFW
2101 Coliseum Boulevard
Fort Wayne, IN 46805

The Paula Program is an enrichment program for gifted and talented girls from the sixth, seventh, and eighth grades, and is held on the Saint Mary's College campus at Notre Dame, Indiana. Eligibility for the program is based on a score of 400 or above on either the verbal or mathematics section of the SAT and on recommendations from teachers. Core interest areas are English and mathematics, with mathematics study of groups, properties of integers, and computer science. Tuition, room, and board for two weeks is $500. For further information, contact:

Project Director
Paula Program
312 Madeleva
Saint Mary's College
Notre Dame, IN 46556

Textbook Adoption: Junior High/Middle School

In Indiana, mathematics textbooks are now adopted every six years. The Commission on Textbook Adoptions selects up to seven programs to be used in the instruction of a particular course that has been approved by the Commission on General Education. A corporation then selects one program from this approved list for use by students in its system. The statistics which follow are based on adoptions for the 1980-81 academic year, and are taken from the Textbook Adoption Report (7-28-81). Many corporations have multiple or split textbook adoptions in the elementary schools and junior high/middle schools; hence, the totals for each category are not equal.

Category 6: Basal Math	Grade 6	N = 312
Publisher	*Number of Corporations*	*%*
1. D.C. Heath	167	53.5
2. Scott Foresman	48	15.4
3. Houghton Mifflin	47	15.1
4. Holt, Rinehart, and Winston	21	6.7
5. Addison-Wesley	18	5.8
6. Harcourt Brace Jovanovich	7	2.2
7. Charles E. Merrill	0	0.0
* Not offered	3	1.0

Category 7: Basal Math	Grade 7	N = 331
Publisher	*Number of Corporations*	*%*
1. D.C. Heath	92	27.8
2. Charles E. Merrill	76	23.0
3. Houghton Mifflin	65	19.6
4. Holt, Rinehart, and Winston	38	11.5
5. Addison-Wesley	28	8.5
6. Scott Foresman	22	6.6
7. MacMillan	6	1.8
* Not offered	4	1.2

Category 8: Basal Math	Grade 8	N = 335
Publisher	*Number of Corporations*	*%*
1. D.C. Heath	86	25.7
2. Charles E. Merrill	77	23.0
3. Houghton Mifflin	65	19.4
4. Holt, Rinehart, and Winston	40	11.9
5. Addison-Wesley	28	8.5
6. Scott Foresman	22	6.6
7. MacMillan	6	1.8
* Not offered	3	0.9

Category 25: Mathematics Special Needs	Grades 6-9	N = 314
Publisher	*Number of Corporations*	*%*
1. Houghton Mifflin	15	4.8
2. Laidlaw Brothers	7	2.2
2. Silver Burdett	7	2.2
4. Benefic Press	4	1.3
5. Fearon Pitman	3	1.0
5. William H. Sadlier	3	1.0
7. Bowmar Noble	2	0.6
* Not offered	273	86.9

Areas of Concern: Junior High/Middle School

Suggestions and concerns expressed by junior high/middle school contact persons overlap considerably with those reported by elementary and high school contact persons. Responses to several of the concerns have been provided in this monograph. These are marked by an asterisk (*). An attempt has been made to categorize and rank the major concerns.

I. Computer Education and Computers
   - A. Implementation of computers
   - B. Software review
   - C. Programming instruction for teachers
   - *D. Computer literacy
   - E. Support group for software exchange
   - F. Comparison of types of computers

II. Curriculum
   - A. Algebra I in Grade 8
   - B. Grades 7-8 curriculum guidelines
   - C. Materials for basic classes
   - D. Problem-solving techniques
   - *E. New programs
   - F. Motivation
   - G. Remedial math lab
   - *H. Gifted and talented programs
   - I. Remediation
   - J. Use of manipulative in mathematics
   - K. Techniques for helping the learning disabled who are mainstreamed

III. Evaluation
   - A. State competency test
   - B. CAPPS
   - C. Teacher-made tests
   - D. Scoring of tests

IV. Calculators
   - A. Calculator use
   - B. Pros and cons of calculators in the general classroom

*V. Mathematics Contests and Conferences

VI. Films for Practical Business Experiences

General Information: High School

Surveys were received from 134 corporations, representing 193 Indiana high schools, 864 mathematics teachers, and 162,632 high school students. A few corporations failed to give one or more of the above pieces of information; the totals reflect only data provided.

As with data for elementary and junior high/middle schools, extremes in data for each general information item are interesting. Again, it appears that the mean is not a good "average" for any of the three items. Based on other enrollment figures, median values probably best reflect Indiana school corporations at the high school level.

TABLE 11

General Information on Indiana High Schools

	High	*Low*	*Mean*	*Median*	*Mode*
Number of High Schools in Corporation (N = 134)	9	1	1.4	1	1
Number of Mathematics Teachers in Corporation (N = 128)	60	1	6.7	5	3
Number of High School Students in Corporation (N = 131)	18,000	100	1,242	850	600

A 9-12 grade arrangement was, by far, the predominant structure for high schools. Some corporations do have more than one grade arrangement for high schools; this fact causes the sample size to be greater than the number of respondents. The various grade arrangements are presented in Table 12 below.

TABLE 12

High School Grade Structures

Grades	*Number of Corporations*	%
K-12	2	1.4
6-12	2	1.4
7-12	39	26.9
8-12	2	1.4
9-12	80	55.2
10-12	20	13.8

Statistics regarding the number of mathematics classes taught in a corporation at the high school level are presented below. The values do reflect corporations that included grades other than 9 through 12.

TABLE 13

Number of Mathematics Classes in Indiana High Schools

High	*Low*	*Mean*	*Median*	*Mode*
300	4	29.9	21	7

Forty-one corporations indicated that they have a mathematics coordinator for high schools; however, several of these coordinators are mathematics department chairpersons, curriculum coordinators, assistant superintendents for instruction, or principals.

Reduced teaching loads for mathematics department chairpersons range from one period to three periods per day, with 64% of the chairmen receiving a one-period reduction.

Department chairpersons in 75 corporations receive additional compensation for their duties. The amounts of and procedures for determining compensation are, indeed, varied. Information from corporations providing data is presented in the frequency tables below. Data regarding the amount and type of compensation are provided in Tables 14, 15 and 16.

TABLE 14

Additional Compensation for Mathematics Department Chairpersons (Fixed Dollar Amount)

Amount	*Frequency*
$2,000 - 2,199	1
1,800 - 1,999	0
1,600 - 1,799	1
1,400 - 1,599	3
1,200 - 1,399	3
1,000 - 1,199	3
800 - 999	4
600 - 799	5
400 - 599	9
200 - 399	20
0 - 199	9

TABLE 15

Additional Compensation for Mathematics Department Chairpersons (Flexible Dollar Amount)

1. $50 per department member
2. 0.007 × base pay
3. $1,000 plus 2 days extra work with pay
4. 9% Base salary
5. $400 plus $25 per department member
6. $5 per class
7. Administrators' salary schedule
8. $600 - 1,200, depending on department size plus extra week with pay
9. $10 per class
10. $350 for 6-teacher department to $700 for 12-teacher department
11. $75 per department member

TABLE 16

Additional Compensation for Mathematics Department Chairpersons (Fixed Dollar Amount)

High	*Low*	*Mean*	*Median*	*Mode*
$2,000	$50	$511.29	$325	$300

Although shortages of qualified mathematics teachers have caused crisis in many states, there does not appear to be such a situation in Indiana. Only 10 corporations indicated difficulty in finding a qualified mathematics teacher. Institutions of higher education and school administrators need to be cautious in interpreting this finding. The interaction of such factors as age of mathematics teachers, computer technology, and low salaries are having a great impact on mathematics education across the

country.

Class sizes for regular classes appear to be typical, with a range from 8 to 32. The mean class size is 24.5, with a median and mode each 25.

Remedial mathematics classes vary in size from 3 to 35, with a mean of 19.7, a median of 20, and a mode of 20.

Honors classes in mathematics are not as widespread as regular or remedial classes. The class sizes ranged from 1 to 40, with a mean of 19, a median of 20 and a mode of 25.

Mathematics Contests and Conferences: High School

In general, there appears to be mixed reaction to participation in mathematics contests and conferences. Although numerous activities exist around the state, participation is usually by the same group of high schools within each region.

Twenty-one corporations do have high school mathematics teams, with schools in eight corporations participating in a league of some type. Only three leagues were listed on the surveys: International Mathematics League, Midwest Mathematics Conference, and Continental Mathematics League. Two corporations pay an advisor for sponsoring teams.

The Annual High School Mathematics (AHSM) Examination, sponsored by the National Council of Teachers of Mathematics, the Mathematical Association of America, the Society of Actuaries, the Casualty Actuarial Society, and Mu Alpha Theta, is conducted in high schools of 45 corporations. Since many high school respondents knew little or nothing about the contest, a brief description is provided:

The AHSM Examination has been designed to create and sustain interest in mathematics; develop sound scholarship in the subject; provide challenging problems which teach, stimulate, and provide enjoyment for the participants and their teachers; and broaden and deepen the student's experience with mathematical concepts. Students answer 30 questions of equal weight which vary from relatively easy to very difficult, requiring the students to meet new situations. Ninety minutes of actual working time is allotted. The examination is held each year on the Tuesday between March 4 and March 10. Team scores are determined by adding up the three highest scores of students in grades nine through twelve. Several individual awards are offered.

For further information about the examination, contact the Regional Examination Coordinator:

Stephen Terry
The Nyhart Company
3505 Washington Boulevard
P.O. Box 88187
Indianapolis, IN 46208

Twenty-four different contests were listed by contact persons. Follow-up letters were sent to representatives of each contest, requesting a brief description of their contests. Information is provided below where available.

The Tri-State University Math Contest is a two-hour test consisting of 6 to 8 problems for 11th and 12th grade students.

The Indiana University at South Bend High School Math Contest includes individual competition in one of the following: Algebra I, Geometry, Algebra-Trigonometry, Analytic Geometry-College Algebra, and Calculus, followed by team competition divided into the same categories. The cost is $2 per student.

The Roger Purdue-North Central Invitational Math Contest is divided into four divisions: Algebra I, Geometry, Algebra II-Trigonometry, and Comprehensive. Each school may bring a maximum of three students per division to the contest. Individual and team awards are given, with a traveling trophy given to the winning school.

The Saint Mary's College Mathematics Contest for High School Women consists of individual and team competition in three categories: Algebra II, Geometry, and Advanced Mathematics. Trophies, ribbons, and certificates are presented to participants. The cost is $20 per 9-member team.

The High School Mathematics Contest co-sponsored by Saint Mary-of-the-Woods College and Rose-Hulman Institute of Technology is for students in grades 9-12. Each school may enter two girls and two boys from each of the four grades. Boys are tested at Rose-Hulman and girls at Saint Mary-of-the-Woods. Awards are given to the top eight boys and top eight girls, along with three class awards for each of the four grades and three school awards to schools with full teams at all four class levels. The registration fee is $1.50 per student. Twenty multiple-choice questions are given at each grade level. For further information, contact:

Sister Ellen Cunningham, S.P.
Saint Mary-of-the-Woods College
Saint Mary-of-the-Woods, IN 47876

Computer contests are also sponsored by the University of Louisville, Kentucky and by some Marion County high schools.

Others for which no other information was available:

Manchester College Field Day
Fort Wayne Community Schools Problem-Solving Contest
Taylor University Field Day
Bellarmine College
Franklin College
Indiana State University-Evansville
Oakland City College Algebra Contest
Indiana Mathematics League
National Computer Contest
Calculus Contest (New York)
Indiana University
Chesterton Invitational
Michigan City Rogers High School Mathematics Contest
Purdue-Calumet
Marion County Math Day
TEAMS Contest
Westchester Middle School Math Contest
Midwest Mathematics Contest
Indiana University Northwest Calculator Tournament
Mathematics, Science, Engineering Test at Calumet College
Continental Math League

High school mathematics clubs exist in 35 corporations, along with six computer clubs and two chess clubs. Chapters of Mu Alpha Theta, the national honorary mathematics society for high school and junior college students, were active in nine corporations. Again, many respondents did not know about Mu Alpha Theta. A brief description is provided:

The National High School and Junior College Mathematics Club, Mu Alpha Theta, was formed to engender keener interest in mathematics, to develop sound scholarship in the subject and promote enjoyment of mathematics among high school and junior college students. Any high school giving training may petition to have a chapter, providing it meets these minimum requirements: 1) At least six semesters of mathematics including algebra, geometry, and more advanced topics must be offered; 2) During the two semesters preceding that in which a petition is submitted, the school must have employed at least one teacher whose primary teaching field is mathematics and who has completed an undergraduate mathematics major or its equivalent at an accredited college or university.

High school students who have completed the equivalent of four semesters of college preparatory mathematics and in addition have completed or are enrolled in a still more advanced course, are eligible for full membership, providing their mathematical work was done with distinction (at least a B average on the ABCDF grading scale).

Regional meetings and other activities are constantly being arranged by the chapters. National meetings are held with lectures by outstanding mathematicians, as well as by students. The Mathematical Log is the official journal and contains articles on mathematics, along with other items of interest. For further information, contact:

Mu Alpha Theta
601 Elm Avenue, Room 423
Norman, OK 73019

Computer Education: High School

With the advent of the microcomputer and the demands of society for computer education, high school mathematics departments across the United States have been forced to modify and change their traditional programs to accommodate the growing number of students interested in computer technology and its many facets.

The National Council of Teachers of Mathematics recently adopted a position statement on computer education:

"Although computers have become an essential tool of our society, their diverse and sustained effects on all of us are frequently overlooked. The astounding computational power of the computer has altered priorities in the mathematics curriculum with respect to both content and instructional practices. Improvements in computer technology continue to make computers, minicomputers, and programmable calculators increasingly accessible to greater numbers of students at reasonable cost.

"An essential outcome of contemporary education is computer literacy. Every student should have first-hand experiences with both the capabilities and the limitations of computers through contemporary applications. Although the study of computers is intrinsically valuable, educators should also develop an awareness of the advantages of computers both in interdisciplinary problem solving and as an instructional aid. Educational decision makers, including classroom teachers, should seek to make computers readily available as an integral part of the educational program."

Results of the survey support the nationwide trend of computer education. Of the 134 corporations responding to the high school survey, 112 (83.6%) indicated that they do have computers for educational use in their high schools. Seventy-six corporations have computer courses offered in their high schools. In addition, six offer data processing courses.

Instruction and computer literacy are the two main purposes for computer use. Other uses are listed in Table 17 below:

TABLE 17

Computer Use

Purpose	*Number of Corporations*
Instruction	68
Literacy	20
Math Class	17
Science Class	7
Remedial	4
Business	5
Accounting	1
All Subject Areas	4
Gifted	2
Computer Assisted Instruction	4
Math Club	3
Independent Study	2
Vocational Education	1
Recreation	2

Even with the widespread use of computers within the state, few corporations have written definitions of computer literacy. Many contact persons at the high school level saw the need for such statements and indicated that their corporations were directing attention to such a definition. Representative computer literacy definitions are presented to assist corporations in developing their own.

Valparaiso Community Schools

To be computer literate, we feel that a student must be able to define, demonstrate, or discuss:

1. The impact computers have on society through their use, yet realizing their limitations;

2. The impact that computer use has on careers;
3. In simple terms, how a computer does its work;
4. A person's rights and responsibilities in use of a computer;
5. Basic computer vocabulary; and
6. How to use a computer by running, inputing, or writing a program appropriate to the course and student.

Ben Davis High School, Indianapolis

Computer literacy must become a prominent program goal of secondary mathematics instruction. Students must develop a general understanding of the capabilities and limitations of computers and effects computers have upon individuals and society. Every student should eventually understand what a computer can and cannot do. Contact with computer information and "hands-on" teaching-learning experiences must expand beyond a few very able mathematics students. For example, some students will be expected to write computer programs working directly or indirectly with terminals and printouts. Each student should eventually have the opportunity to respond directly with a computer via a terminal in their junior high school experience. As much as possible, students should have "hands-on" experience in writing a simple program using the subject matter in present math courses.

As programs expand beyond computer literacy for all secondary students and special elective classes for those motivated, other instructional uses should be developed. Drill, practice and tutorial programs for motivation and remediation should be designed.

All secondary mathematics teachers should develop a basic level of knowledge and skill to teach computer literacy. Toward that end, workshops should be provided to inform teachers of information, equipment and functions, and instructional applications.

Delphi Community High School

...computers are "into" our everyday lives. Therefore, students should become familiar with some or all of the following:

1. What a computer can and cannot do.
2. How to use a computer confidently and with competence.
3. How to apply programming to analyze a problem and solve it by understanding.
4. How to apply this knowledge to both practical and theoretical situations.

Highland High School

In order to be computer literate, a person should have the knowledge of what an up-to-date computer system will and will not do. The person must also have a basic understanding of computers: 1) Input, 2) Output, 3) Central Processing Unit. The person must understand that a computer must be programmed; and at a high level of literacy, be able to do some simple programming.

Evansville - Vanderburgh School Corporation

Goals

1. To prepare students to become effective and adaptive citizens of a changing society by assisting in the attainment of knowledge of the role of the computer in modern society.
2. To assist students in the acquisition of knowledge and skills in the development of intellectual curiosity and in the understanding and appreciation of human achievement in computer science.
3. To provide students opportunity, encouragement, and desire to develop creative potential for the technological progress of society.
4. To assist students in the development of a respect for the dignity of work and an awareness of skills and abilities required for occupations in computer science.
5. To prepare students for further study toward a salable skill in computer science.
6. To provide students with opportunities for the development of meaningful interests, leading toward participation in a range of intellectual and creative leisure-time activities with computers.
7. To instruct students in the knowledge and practice of safety habits in the use of electronic equipment.
8. To develop in students the attitudes which will permit them to demonstrate such qualities as fairness, tolerance, courtesy, kindness, and honesty in the handling and sharing of limited computer

equipment.
9. To provide students with an understanding and respect for the present and future uses of computers in the home.

Baugo Community Schools, Elkhart

Computer literacy is helping our students find out the uses for computers in today's world. Computer literacy is dealing with pupil apprehension concerning the nature of computers. Students need to know what computers can do and what they cannot do. Literacy is also understanding the terminology and vocabulary associated with computers. Computer literacy is providing "hands on" experiences with microcomputers and accompanying components.

Concern was also expressed as to what should be offered in a high school computer course. Should the emphasis be on programming skills or on applications of the computer to subject matter areas? Many topics are common to most introductory course syllabi: History of computers, impact of computers on society, flowcharting, computer terminology, computer programming, and problem solving with the computer. Several course syllabi were received with completed surveys; samples are provided below, along with additional course information.

Jay County High School, Portland

Course Objectives

1. Students will learn how to program a computer to perform a specific task in the BASIC programming language.
   A. They will develop the ability to flowchart a problem when given the proper statements concerning the problem to be solved.
   B. They will be able to develop elementary programs using BASIC statements such as LET, PRINT, and INPUT.
   C. They will be able to write computer programs using logic and control the output using special print functions.
   D. They will be able to develop programs which contain loops that allow processing, counting and basic sort techniques.
   E. They will be able to write programs handling large matrices and make calculations within the matrix.
2. Students will become aware of the many careers and the training required which utilize computer techniques.
3. Students will be able to advance further into the study of computers with only occasional supervision and guidance.
4. Students will be aware of the impact the computer has upon our society and the projection of that impact into the future.

Course Outline

Computer History
Computer Flowcharting
  Flowcharts involving decisions
  Processing more than one set of data
Elementary Programs
  Tracing a program
  Numbering statements
  Legal variables
  Math operations in BASIC
  Program documentation
Apple Computer Hardware
Writing and Running Programs
Controlling Output
  Line format and multi-statements
  Skipping lines
  Columns and headings
  Tab functions
  Decision statements
Loops
  Counting
  Loops containing decisions
  Nested loops
Subscripted Variables
  Dim statements
  Sort algorithm
  Subroutines
Matrices
  Adding matrices
  Multiplication and other math operations
  Print instructions
Strings and String Variables
  File operations
  Random function
  Def statements
Computer Applications

South Knox High School, Vincennes

1. Development of computers
   A. First computers
   B. Present day computers
   C. Future computers
2. Flowcharting
   A. Why use a flowchart
   B. Symbols for flowcharting
   C. Tracing flowcharts
   D. Projects
3. Simple Programs
   A. Operation of the TRS-80
   B. Relationship of flowcharts to programming
   C. Line numbers
   D. Basic commands
   E. TRS-80
   F. Other BASIC
   G. Projects
4. Formatting Output
   A. Use of: commas, semicolons, tab functions, PRINT @, PRINT, LPRINT
   B. Projects
5. Loops
   A. Counting
   B. Legal loops
   C. Projects
6. If-Then statements
   A. Projects
7. Advanced Programming
   A. Use of subscripts
   B. Dim statements
   C. Bubble sort
   D. Gosub - Return
   E. Stop
   F. Matrices
   G. Strings
   H. Projects
8. Operation of a Disk System
9. Practical Application Projects

Garrett High School

1. History of computers and computer components
2. Social applications and implications of the use of computers
3. Operation of Radio Shack TRS-80 microcomputer system and other types
4. Language and functions and their uses of Radio Shack's Level II BASIC programming language
5. Construction of flow charts related to programming
6. Debugging of incorrect programs
7. Occupations and career opportunities in the data processing field
8. Computer graphics
9. Future uses and applications of computers
10. CAI - Computer Assisted Instruction
11. Semester project consisting of writing a program in the student's chosen field
12. Computer terminology

A. COBOL
B. ADA
C. BASIC
D. others

Kokomo High School

1. Introduction of TRS-80 machines and saving and loading programs (1 week)
2. Teach READ, DATA, INPUT, LET and IF-THEN statements and simple programs to practice their use (1 week)
3. Introduce counters, branching and debugging and a program to practice these new instructions (1 week)
4. Flow charting (2 weeks)
5. Introduce FOR-NEXT loops and 2 programs to practice their use (2 weeks)
6. Introduction of Disk storage and its access (1 week)
7. Teach defined functions and subroutines and 2 programs to practice (2 weeks)
8. Introduce subscripted variables and arrays and assign 2 programs to practice (2 weeks)
9. Print using and tab statements (1 week)
10. Plan a project of their own choosing. This program should use most of the statements learned and should be of a much longer nature.
11. Work on projects with instruction and simple programs on INKEY, SET, RESET, PRINT @ and other video features.

Merrillville High School

This is a one-semester laboratory course which offers instruction in Computer Programming in the BASIC language. Extensive use will be made of the PET 2001 Computer. Approximately nine weeks will be devoted to instruction in the fundamentals of BASIC. The following nine weeks will consist of writing programs involving mathematical applications of the computer. These programs will include but not be limited to solutions of equations and systems of equations, graph generations, probability and statistics, series and progressions, and the evaluation of mathematical functions.

Decatur Central High School, Indianapolis

1. Display a knowledge of the history of computer science and the role of the computer in modern society.
2. Analyze the role of computer technology in society; past, present and impact on our future.
3. Describe how recent computer technological advances have affected his/her family and school.
4. Describe the possible negative effects of a technological invention for society and the environment.
5. Describe the historical development of the digital and microcomputers.
6. Describe the potential uses of computer technology in society.
7. Describe in detail the utilization of computer technology in two areas of personal interest.
8. List and describe ways in which the computer is being used in government, communications, military, and business.
9. Analyze programs on selected problems by constructing flow charts.
10. Describe in written or oral form, the process involved in a flow chart solution.
11. Draw a flow chart.
12. Appreciate the usefulness of problem-solving approach by using flow charts to analyze personal problems.
13. Interpret computer print-outs with special attention given to order, sequence, and detail.
14. Design algorithms for selected problems, and write a program in a computer language to solve the problem.
15. Describe sequence of operations.
16. Write a program for a simple algorithm.
17. Operate a computer keyboard as a means of computer input.
18. Develop a proficiency in BASIC, in order to write and prepare programs to solve a variety of mathematical and scientific problems.
19. Describe a computer program in sufficient detail as to communicate the basic components of the program to a computer programmer.

20. Define and describe the function of a subroutine.
21. Write a program based on sequence.
22. Rewrite (debug) programs which are rejected by the computer.
23. Describe the operation of related equipment, such as the teletypewriter, cardreader, printer, etc., necessary to process programs.
24. Discriminate among the results of the output, and choose what is significant.
25. Exhibit a knowledge of the career opportunities that exist in the computer science field.
26. Identify and describe various occupations related to computers.
27. Explore at least two occupational choices related to computer technology.
28. List the limitations and strengths of the computer by noting what it can and cannot do.
29. Write increasingly complex programs for problems pertaining to other courses.
30. Understand the functions and use of the components of a computer system.
31. Define the following terms: A) Computer, B) Flow Chart, C) TT, D) Input-Output, E) CRT.
32. Describe in general terms how a computer system works.
33. Define the five main components of the digital computer.
34. Describe in writing the interaction of the various components of a computer during the execution of a program (hardware & software).
35. Describe a card reader, magnetic tape, disc and line printer.
36. Operate the special features of a computer system.

Eastern District High School, Bloomfield

This course will be taught with emphasis on actual programming experience. BASIC computer language will be used and other computer languages will be introduced. Included in the content will be history of computer science, flow charting, program design, techniques, data structures, looping arrays, and other topics.

Grades will be based on daily work, exams, and projects. Career opportunities will be included.

The types of computers currently being used are quite varied. Although names of computers were given, the number of terminals in use by students is not known. Table 18 lists the types of computers and the corresponding number of corporations using them.

TABLE 18

Types of Computers in Use

Type	*Number of Corporations*
Radio Shack TRS-80 (No model indicated)	50
TRS-80 Model I	2
TRS-80 Model II	5
TRS-80 Model III	5
Apple	28
Commodore Pet	15
Atari	2
IBM (No model indicated)	1
IBM-1130	2
IBM-3400	1
IBM-370-115	1
PRIME	2
NCR	2
Burroughs	1
Hewlett Packard 85	1
Hewlett Packard 2000	1
Texas Instruments 99/4	1
Alpha Micro	1
Heath H-89	1
Monroe	1
DEC 10	2
DEC PDP 1134	3
Processor Technology (Sol-20)	1
Time Sharing with Large System	5

BASIC is the predominant programming language being used in the state; however, courses are also being taught using FORTRAN, COBOL, RPG, and assembly language.

The Indiana Department of Public Instruction conducted a Computer Use Survey in the spring of 1981. Results reported by John Hesemann, Director of the Division of Educational Information and Research, indicated that 176 of 206 responding corporations had corporation-operated or externally operated computers for educational use. The percent for academic use (85.4%) compares favorably with the 83.6% found in this survey. Similarly, Hesemann found that the top uses of computers were computer science/data processing (i.e., programming) and computer literacy. As might be expected, the top three manufacturers are the same, and the corresponding percents are comparable:

Type	*Spring 1981*	*Fall 1981*
Radio Shack	33.0%	46.3%
Apple	22.6	20.9
Commodore Pet	8.1	11.2

Prerequisites for enrolling in computer courses vary considerably. No particular sequence of courses dominated the findings; although, Algebra I was included in most. Only a few corporations responded to the item. Those prerequisites offered are listed below:

Algebra I
Algebra I with C or better
Algebra I and Geometry
Algebra I and Algebra II
Algebra I and one semester of Algebra II
Algebra II or Precalculus
Geometry
Majors only

Computer literacy has not yet become a universal goal of school mathematics instruction; however, general understanding of the capabilities and limitations of computers must become part of all students' education.

Calculators: High School

The use of calculators in high school is quite extensive, with 98 corporations indicating that they are used and 30 corporations indicating their use sometimes. Seventy-two corporations reported owning calculators for student use. Information about the number of corporation-owned calculators was lacking on many surveys. The mean number of calculators for those corporations that did report was 58.8, with a median of 25 and a mode of 10. The number of calculators ranged from 900 to 1.

Similar to the results of the Elementary Survey, the types of corporation-owned calculators are quite varied, with Texas Instruments calculators being the most popular. Table 19 presents a list of those reported.

TABLE 19

Types of Corporation-Owned Calculators

Type	*Number of Corporations*
Texas Instruments	50
Casio	9
Sharp	5
Hewlett-Packard	2
Victor	2
Monroe	2
Radio Shack, Rockwell, Sears, Panasonic, NCR, Olympia, Adler, NSC	1 each

The TI-30 was the most popular model reported in use at the high school level.

The greatest use of calculators is for higher mathematics courses and science courses (39 corporations). Other categories of use are listed below.

General Mathematics (9)
Classroom Instruction (13)
Homework (4)
Practice, Skill Reinforcement, Checking (13)
Business Mathematics (5)
Problem Solving (4)
Mathematics Contests (1)
Basic Mathematics (4)

One contact person did indicate that within his corporation a recommendation had been made to sell all corporation-owned calculators. Although this particular suggestion can be interpreted in several ways, the general concern among parents is still that calculator use is detrimental to students' learning basic computational skills.

Six corporations reported having a written policy regarding the use of calculators in the classroom. Formal statements can be found in the Elementary and Junior High/Middle School sections of this monograph. One statement indicated that "Students are not allowed to use calculators in General Math, Algebra, and Plane Geometry. The use of calculators is encouraged as an enrichment material in Algebra II and Unified Senior Math."

Gifted Programs: High School

Gifted programs at the secondary level are generally specific mathematics classes. Sixty-four corporations reported having gifted programs; however, it is difficult to make any generalizations about them. Schools with small enrollments appear to offer courses for the gifted which are standard courses in large schools. Below is a list of the programs described on the survey.

8th Grade Algebra (15)
Accelerated 7th Grade Mathematics
Honors Courses in Algebra I, Algebra II, Geometry
Sophomore Algebra II and Geometry
Computer Mathematics
Independent Study
Advanced Mathematics, 5th Year Math
Two 3-week sessions before and after school

Creative Programs: High School

Creative programs were reported by 30 corporations. Again, most of these programs were course specific, or arrangement of courses. New courses in computer programming topped the list with 21 responses. Other courses listed were Modern Abstract Algebra, Solid Geometry, Calculus, and Computer Literacy for Grade 8. Course arrangements included Algebra II before Geometry, two years of Introductory Algebra followed by Informal Geometry, one semester of Computer Programming followed by a semester of Probability and Statistics, Pre-Algebra followed by Algebra I. Programs in Vocational Mathematics and Consumer Mathematics were also listed, along with a successful metric unit for Grade 7. Team teaching of high school courses was also indicated.

College Courses for High School Students

Although concern was expressed by some contact persons about the lack of cooperation between colleges and high schools, 64 corporations indicated that their high school students attended classes at nearby universities or colleges. Those institutions are listed below:

Indiana University
Ball State University
St. Joseph College
Butler University
Tri State University
IU-Southeast
Purdue-Calumet
IU-Northwest
Rose-Hulman
Purdue University
Indiana State University
Franklin College
Valparaiso University
Vincennes University
IU-Kokomo
Purdue-North Central
IUPU-Indianapolis
Saint Mary's College

Curriculum Guide

With the state-mandated CAPPS Program in effect, all corporations reported having printed curriculum guides.

Curriculum: High School

Results of the survey indicate that the college preparatory sequence followed by high school students in Indiana is not a single statewide sequence. The sequences are so varied that it is difficult to categorize them. It appears that the traditional Algebra I, Geometry, Algebra II, Senior Mathematics sequence is still the most popular college preparatory program. Senior mathematics, however, takes many different forms and names: Trigonometry and Analytical Geometry; Trigonometry, Analytical Geometry, College Algebra and Precalculus; College Algebra and Trigonometry; and many others. The second most popular sequence is Algebra I, Geometry, Algebra II, Trigonometry and Analytical Geometry, and Calculus. Several variations of this sequence also exist.

A very small number of high schools use an Algebra I, Algebra II, Geometry, Senior Mathematics sequence. Others include Algebra I, Geometry, Algebra II, Senior Mathematics, and Computer Programming; Algebra I, Geometry, Algebra II, Senior Mathematics, and Probability and Statistics. Only two schools reported offering only Algebra I, Geometry, and Algebra II.
schools reported offering only Algebra I, Geometry, and Algebra II.

Modified college preparatory sequences were few in number, and often involved only deleting the most advanced course of the regular sequence. A unique sequence included a computer electronics course as a final course; whereas another sequence began with a mathematics applications course.

Trigonometry is generally taught in a one-semester course or in Algebra II. The one-semester course is part of a senior mathematics course, in many cases. Trigonometry is also taught in Geometry and Algebra I.

Most corporations have a minimum mathematics requirement for graduation which is the same as that required by the state — one year (2 credits) of mathematics. Thirteen corporations do require two years of mathematics; two require passing a locally constructed competency test; one requires a score in the 3rd stanine of a standardized test; and one requires three semesters of mathematics.

Transformational geometry is taught in only nine corporations. Information provided does not indicate whether a separate course is offered.

With the variety of college preparatory sequences in existence, it is also difficult to generalize the content of a top level mathematics course. The following list of reported topics covers both senior mathematics and calculus.

Trigonometry: Circular Functions
Analytical Geometry:
  Conics, Polar Coordinates, Transformations
Solid Geometry
College Algebra and/or Analysis:
  Real Functions, Circular Functions, Transcendental Functions, Exponential Functions, Curve Sketching, Logarithms, Number Systems, Complex Numbers, Sequences and Series, Matrices, Number Theory, Cramer's Rule, Linear Transformations, Theory of Equations, Vectors, Proofs, Problem Solving toward Engineering
Calculus:
  Limits, Continuity, Inverse Functions, Differential Calculus, Maxima/Minima, Integral Calculus, Riemann Sums, Area, Rates of Change
Computer Programming
Abstract Algebra
Probability and Statistics:
  Permutations, Combinations, Binomial Expansion

As one might expect, the non-college preparatory mathematics program generally included one course not in the college preparatory sequence. Listed below are those courses reported on surveys. General Mathematics was the most frequently listed course, followed by Consumer Mathematics and Business Mathematics.

General Mathematics
Consumer Mathematics
Business Mathematics
Basic Mathematics (not General)
Introductory Algebra
Basic Geometry
Trade Mathematics
Applied Mathematics
Living Mathematics
Shop Mathematics
Industrial Mathematics
Vocational Mathematics
Refresher Mathematics
Informal Geometry
Senior Applied Mathematics
Intermediate Mathematics
Related Mathematics

Professional Organizations: High School

Information on membership in professional organizations was quite sketchy. Data is presented in Table 20 below.

TABLE 20

Professional Memberships

Organization	*Number*
Indiana Council of Teachers of Mathematics	173
National Council of Teachers of Mathematics	183
School Science and Mathematics Association	8
NCTM Affiliated Groups	27
Indiana Computer Educators	4
Mathematical Association of America	2
Computer Educators Association	1

Advanced Placement Calculus

The Advanced Placement Program is a program of college-level courses and exams for secondary school students. About 23 percent of the nations' secondary schools offer some college-level AP course work.

An AP course is a special college-level learning experience that most often takes a full academic year. It may not be called an "AP Course", and it may not even be a course. It can take the form of an honors class, a strong regular course, a tutorial, or independent study. It is usually challenging and stimulating, and often takes more time, requires more work, gives greater opportunity for individual progress and accomplishment, and goes into greater depth.

All AP exams contain both multiple-choice questions and free-response questions, one on each of two college full-year mathematics courses: Calculus AB (elementary functions and introductory calculus) and Calculus BC (extending one semester beyond AB). Students take only one exam. Every examination receives an overall grade on a five-point scale. An AP Grade Report is sent in early July to each student and, if the student requested, to his or her college. The fee is $42 for each exam. Each year, the examinations are given by schools throughout the world. Most students take the examination in their own school; others take them in multischool centers.

For further information, contact the Advanced Placement Program, Box 977-PD, Princeton, New Jersey 08541.

Results of the survey indicated that 16 Indiana school corporations do offer Advanced Placement Calculus, while 20 other corporations offer courses comparable to it. Students also take the calculus at

nearby universities. Class sizes ranged from 1 to 44, with a mean of 16. Procedures for selection include previous mathematics grades, teacher recommendations, four courses in mathematics, and student option.

Sample course syllabi for Calculus 1 and Calculus 2 at Kokomo High School are presented.

Kokomo High School
April 1981

Calculus 1

Course Description:

Calculus 1 offers a concise study of the following topics:

1) Functions and the limit of a function.
2) Development of the derivative and its application.
3) An intuitive approach to integration.
4) Rigorous discussion of continuity and limits.

Materials Used in Course:

Calculus Including Analytic Geometry, Lynch. Publisher, Ginn.

General Objectives:

Through participation in drills, daily exercise, class discussion, and tests, the student will demonstrate ability to:

Define union and intersection of sets, the number line, absolute value, distance between points, triangle inequality, intervals, neighborhoods, punctured neighborhoods and graphing of linear functions in the Cartesian Plane.
Form linear equations from given conditions such as two points, slope and A point, and slope Y-intercept.
Define relation and function.
Define circular functions and related trigonometric properties.
Define composite and inverse functions.
Define slope of a curve and the derivative.
Apply Rules of Differentiation.
Investigate applications of the derivative such as curve tracing, extreme points and values, maxima, and minima.
Define the definite integral.
Apply the fundamental theorem.
Compute areas of plane regions.
Solve elementary differential equations.
Compute volumes of solids of revolution.
Solve problems involving accelerated motion.
Define continuity and limit of a function.
Prove and apply Role's Theorem and the Mean Value Theorem.

Through a standardized, updated departmental exam, the student will demonstrate his/her mastery of the above.

Calculus 2

Course Description:

Calculus 2 is a continuation of Calculus 1 with more theoretical aspects discussed. The emphasis is on the following topics:

1) The differential.
2) Applications of the derivative and the differential.
3) The definite integral.
4) The logarithmic and exponential functions.
5) Some techniques of integration.

Materials Used in Course:

Calculus Including Analytic Geometry, Lynch. Publisher, Ginn.

General Objectives:

Through participation in drills, daily exercises, class discussion, and tests, the student will demonstrate ability to:

Define the differential.
Determine derivatives of products and quotients.
Differentiate composite, implicit, and circular functions.
Apply the derivative in the following ways:
  1) related rates
  2) extreme values
Integrate by substitution.
Compute volumes with the definite integral by disk, washer, shell, and cross section methods.
Define logarithmic and exponential functions.
Differentiate logarithmic and exponential functions.

Through a standardized, updated departmental exam, the student will demonstrate his/her mastery of the above.

Enrollment in Mathematics Classes: High School

Enrollment figures for the various mathematics classes listed on the survey are presented in Table 21. Of interest are the data indicating more girls than boys enrolled in Algebra I. For Geometry and Algebra II, there are small differences in the percentages for boys and girls, although more boys are enrolled in each class. Results for advanced mathematics classes are similar to national results: Fewer girls are enrolled in advanced mathematics.

TABLE 21

Mathematics Class Enrollment

General Mathematics

9th		*10th*		*11th*		*12th*		
Female	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Total**
2725	3199	817	1040	81	138	33	48	12,647

Totals:	*Female*	*Male*
	3656	4425
	45.2%	54.8%

Algebra (1-yr)

9th		*10th*		*11th*		*12th*		
Female	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Total**
4722	4216	1085	1223	298	244	93	137	16,153

Totals:	*Female*	*Male*
	6098	5825
	51.1%	48.9%

Algebra II (Adv.)

9th		*10th*		*11th*		*12th*		
Female	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Total**
134	110	1006	1067	2888	3082	366	419	16,712

Totals:	*Female*	*Male*
	4394	4678
	48.4%	51.6%

Geometry

9th		*10th*		*11th*		*12th*		
Female	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Total**
509	477	4353	4353	745	878	148	179	21,232

Totals:	*Female*	*Male*
	5755	5887
	49.4%	50.6%

Algebra (1st of 2-yr course)

9th		10th		11th		12th		
Female	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Total**
1169	1206	36	57	35	57	2	3	2760

Totals:	*Female*	*Male*
	1242	1323
	48.4%	51.6%

Algebra (2nd of 2-yr course)

9th		10th		11th		12th		
Female	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Total**
10	7	868	867	41	45	6	9	2021

Totals:	*Female*	*Male*
	925	928
	49.9%	50.1%

Precalculus**

9th		10th		11th		12th		
Female	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Total**
0	1	1	0	282	359	742	1013	3002

Totals:	*Female*	*Male*
	1025	1373
	42.7%	57.3%

Senior Math**

12th		
Female	*Male*	*Total*
26	49	75

Totals:	*Female*	*Male*
	34.7%	65.3%

Trigonometry**

9th		10th		11th		12th		
Female	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Total**
		1	0	467	677	798	1096	3765

Totals:	*Female*	*Male*
	1266	1773
	41.7%	58.3%

Analytic Geometry**

11th		12th		
Female	*Male*	*Female*	*Male*	*Total**
316	489	582	808	2689

Totals:	*Female*	*Male*
	898	1297
	42.7%	57.3%

Probability and Statistics

11th		12th		
Female	*Male*	*Female*	*Male*	*Total*
0	1	62	75	138

Totals:	*Female*	*Male*
	62	76
	44.9%	55.1%

Consumer Mathematics

9th		10th		11th		12th		
Female	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Total*
139	124	229	217	224	258	286	334	2307

Totals:	*Female*	*Male*
	878	933
	48.5%	51.5%

Business Arithmetic

9th		10th		11th		12th		
Female	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Total*
7	7	436	377	182	154	214	190	1687

Totals:	*Female*	*Male*
	839	728
	53.5%	46.5%

Computer Mathematics

9th		10th		11th		12th		
Female	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Total**
9	20	57	111	372	530	503	635	2956

Totals:	*Female*	*Male*
	941	1295
	42.1%	57.9%

Calculus

	11th		12th		
	Female	Male	Female	Male	Total*
	1	4	453	694	1152

Totals:	Female	Male
	454	698
	39.3%	60.7%

Advanced Computer Programming

Total
30

Vocational Mathematics

10th		
Female	Male	Total
3	27	84

Informal Geometry

10th		11th		
Female	Male	Female	Male	Total
36	53	29	35	153

Remedial Mathematics

9th		10th		11th		12th		
Female	Male	Female	Male	Female	Male	Female	Male	Total
61	65	85	100	13	11	3	3	341

Totals:	Female	Male
	162	179
	47.5%	52.5%

Pre-Algebra

9th		10th		11th		12th		
Female	Male	Female	Male	Female	Male	Female	Male	Total
95	100	38	68	11	16	2	10	763

Totals:	Female	Male
	146	194
	42.9%	57.1%

SAT Prep Course

12th		
Female	Male	Total
7	10	17

College Algebra**

11th Female	11th Male	12th Female	12th Male	Total*
4	6	13	16	91

Topics

12th Female	12th Male	Total
3	16	19

Basic Mathematics

9th Female	9th Male	10th Female	10th Male	11th Female	11th Male	12th Female	12th Male	Total
104	152	14	27	0	1	0	1	299

Basic Mathematics II

10th Female	10th Male	11th Female	11th Male	12th Female	12th Male	Total
33	35	4	13	1	4	90

Basic Algebra (1 yr.)

9th Female	9th Male	10th Female	10th Male	11th Female	11th Male	12th Female	12th Male	Total
121	123	20	29	5	9	1	5	313

Basic Geometry

10th Female	10th Male	Total
33	37	70

Fundamental Mathematics

11th Female	11th Male	12th Female	12th Male	Total
15	15	7	7	44

*Reflects male and female totals and combined totals given by a few corporations

**Courses such as Precalculus, Senior Math, Trigonometry, Analytic Geometry, College Algebra, and Calculus overlap in many cases since certain courses are only one semester in length.

Other mathematics courses with small enrollments are listed below:

- Shop Mathematics
- Data Processing
- Applied Mathematics
- Applied Geometry
- Practical Senior Mathematics
- Industrial Mathematics
- Special General Mathematics
- General Mathematics II

Textbook Adoption: High School

In Indiana, mathematics textbooks are now adopted every six years. The Commission on Textbook Adoptions selects up to seven programs to be used in the instruction of a particular course that has been approved by the Commission on General Education. A corporation then selects one of these adopted programs for use by students in its system. The statistics which follow are based on adoptions for the 1980-81 academic year, and are taken from the Textbook Adoption Report (7-28-81).

Category 9: Basic Mathematics N = 312

Publisher	*Number of Corporations*	*%*
1. Allyn and Bacon	82	26.3
2. Holt, Rinehart, and Winston	53	17.0
3. Addison-Wesley	9	2.9
4. Delmar Publishers	1	0.3
* Not offered	167	53.5

Category 10: General Mathematics I N = 320

Publisher	*Number of Corporations*	*%*
1. Addison-Wesley	76	23.8
2. Houghton Mifflin	57	17.8
3. Charles E. Merrill	39	12.2
4. Silver Burdett	28	8.8
5. Scott Foresman	25	7.8
6. Harcourt Brace Jovanovich	8	2.5
7. American Book	2	0.6
* Not offered	85	26.6

Category 11: General Mathematics II N = 307

Publisher	*Number of Corporations*	*%*
1. Houghton Mifflin	37	12.1
2. Scott Foresman	16	5.2
3. Charles E. Merrill	2	0.7
* Not offered	252	82.1

Category 12: Introductory Algebra N = 319

Publisher	*Number of Corporations*	*%*
1. Houghton Mifflin	50	15.7
2. Harcourt Brace Jovanovich	47	14.7
3. Holt, Rinehart, and Winston	32	10.0
4. Laidlaw Brothers	14	4.4
5. Addison-Wesley	6	1.9
6. Scott Foresman	1	0.3
* Not offered	169	53.0

Category 13: Business Math N = 308

Publisher	*Number of Corporations*	*%*
1. South-Western	86	27.9
2. Gregg Div., McGraw Hill	21	6.8
3. Charles E. Merrill	13	4.2
4. Addison-Wesley	4	1.3
* Not offered	184	59.7

	Publisher	Number of Corporations	%
1.	Scott Foresman	33	10.6
2.	Charles E. Merrill	24	7.7
3.	Harcourt Brace Jovanovich	20	6.5
4.	McCormick-Mathers	16	5.2
5.	South-Western	10	3.2
6.	Addison-Wesley	6	1.9
7.	Holt, Rinehart, and Winston	3	1.0
*	Not offered	198	63.9

Category 15: Shop Mathematics N = 307

	Publisher	Number of Corporations	%
1.	Houghton Mifflin	32	10.4
2.	Delmar	13	4.2
3.	Silver Burdett	5	1.6
4.	Prentice-Hall	4	1.3
5.	Gregg Div., McGraw Hill	2	0.7
*	Not offered	251	81.8

Category 16: Algebra Unit I N = 286

	Publisher	Number of Corporations	%
1.	Houghton Mifflin	168	58.7
2.	Holt, Rinehart, and Winston	37	12.9
3.	Charles E. Merrill	36	12.6
4.	Laidlaw Brothers	22	7.7
5.	Harcourt Brace Jovanovich	13	4.5
6.	Scott Foresman	3	1.0
*	Not offered	7	2.4

Category 17: Algebra Unit II N = 314

	Publisher	Number of Corporations	%
1.	Houghton Mifflin	167	53.2
2.	Charles E. Merrill	37	11.8
3.	Holt, Rinehart, and Winston	34	10.8
4.	Addison-Wesley	29	9.2
5.	Harcourt Brace Jovanovich	24	7.6
6.	Laidlaw Brothers	16	5.1
7.	Scott Foresman	3	1.0
*	Not offered	4	1.3

Category 18: Geometry N = 258

	Publisher	Number of Corporations	%
1.	Houghton Mifflin	160	62.0
2.	Holt, Rinehart, and Winston	25	10.0
3.	Scott Foresman	22	8.5
4.	Harcourt Brace Jovanovich	18	7.0
5.	Addison-Wesley	13	5.0
6.	McCormick-Mathers	9	3.5
7.	Laidlaw Brothers	6	2.3
*	Not offered	5	1.9

Category 19: Informal Geometry N = 301

Publisher	*Number of Corporations*	*%*
1. Houghton Mifflin	40	13.3
* Not offered	261	86.7

Category 20: Analytical Geometry N = 301

Publisher	*Number of Corporations*	*%*
1. Addison-Wesley	80	26.6
2. Houghton Mifflin	49	16.3
* Not offered	172	57.1

Category 21: Trigonometry N = 307

Publisher	*Number of Corporations*	*%*
1. Webster Div., McGraw Hill	66	21.5
2. Addison-Wesley	32	10.4
3. Prentice-Hall	24	7.8
4. Houghton Mifflin	16	5.2
5. Bowmar Noble	10	3.3
* Not offered	159	51.8

Category 22: College Algebra N = 300

Publisher	*Number of Corporations*	*%*
1. Addison-Wesley	20	6.7
1. Webster Div., McGraw Hill	20	6.7
3. Bowmar Noble	10	3.3
4. Prentice-Hall	5	1.7
* Not offered	245	81.7

Category 23: Advanced Mathematics (Unified) N = 300

Publisher	*Number of Corporations*	*%*
1. Harcourt Brace Jovanovich	69	22.2
1. Houghton Mifflin	69	22.2
3. Addison-Wesley	32	10.3
4. Charles E. Merrill	26	8.4
5. American Book	10	3.2
6. Webster Div., McGraw Hill	3	1.0
7. Bowmar Noble	2	0.6
* Not offered	100	32.2

Category 24: Mathematics Special Needs **Grades 1-6**

See Elementary Section of Monograph

Category 25: Mathematics Special Needs **Grades 6-9**

See Junior High/Middle School Section of Monograph

Category 26: Mathematics Special Needs	Grades 9-12	N = 316
Publisher	*Number of Corporations*	%
1. William H. Sadlier	15	4.7
2. Houghton Mifflin	12	3.8
3. Scholastic Magazine	8	2.5
4. Benefic Press	5	1.6
5. Fearon Pitman	2	0.6
* Not offered	274	86.7

Areas of Concern: High School

Many suggestions and concerns were listed by high school respondents. Responses to several of the concerns have been provided in this monograph. These are marked by an asterisk (*). An attempt has been made to categorize and rank the major concerns.

I. Computer Education and Computers
- A. Hardware/Software Review; New Developments
- *B. Computer Literacy; Course Syllabi; Curriculum
- C. Computer Programming Texts
- D. Software Exchange
- E. Acquisition of Microcomputers
- F. Indiana Department of Public Instruction attitude about a computer curriculum
- G. Successful computer education programs within Indiana
- H. Computer software for non-computer classes

II. Curriculum
- A. Algebra I in grade 8; lack of high school credit
- *B. Pros and cons of calculus in high school; *course content; *number of schools offering calculus; recommendations of the Indiana Department of Public Instruction
- C. Consumer Math Programs
- D. Curriculum changes in the United States and other countries
- *E. Number of students taking regular algebra and geometry
- *F. Course content for fifth year mathematics class
- G. Assistance with remedial programs; new ideas, materials; inservice workshops
- H. Supplementary materials for practical application problems
- I. Corporations using AMSCO integrated mathematics course

III. Evaluation
- A. Metric literacy test
- B. Proficiency test after Algebra I, Geometry, Algebra II, and Advanced Mathematics
- C. Average state statistics; comparison of Math SAT scores in Indiana; comparison of math competency at Grade 9 in Indiana; declining grades in math classes

IV. Mathematics Programs
- *A. Newsletter about latest developments in mathematics education, new and creative programs, and gifted programs within Indiana
- B. Expectations of colleges for high school mathematics programs; skills which college professors find freshmen lacking
- C. Funding for programs
- D. Aid for handicapped students

V. Calculators
- *A. Types of calculators to use
- B. Textbooks for calculator usage in general math
- C. Extent of calculator use in algebra, trigonometry, calculus, and general math
- *D. Policy on calculators
- *E. Calculator contests

*VI. Mathematics Contests and Conferences

VII. Textbooks
- *A. Adoption results
- B. Available textbooks
- C. State mathematics library; books, papers, films, and filmstrips

VIII. High Schools and Higher Education
- A. Working relationship with universities in offering mathematics courses for high school students
- B. Guest speakers in applied mathematics
- C. Variation in college mathematics entrance requirements.

*D. Shortage of competent mathematics teachers
E. Consideration of teacher education programs in mathematics
F. Stronger mathematics backgrounds for elementary teachers teaching mathematics

IX. Miscellaneous Concerns
A. Available workshops
B. Develop programs for community awareness of the need for mathematics in society
C. Updated mathematics guidelines (currently 1977)
*D. Mathematics department chairpersons; elementary coordinators or supervisors

Interest in reviving the statewide mathematics contest is mixed. Presentations at recent Indiana Council of Teachers of Mathematics meetings have drawn strong support from participating high school teachers. An organizational meeting was held in the late fall of 1981 to start initial plans for a contest. Responses to the survey indicated that 66 corporations were possibly interested in reviving the contest. Cost and travel were major factors to consider. For further information, contact: Dr. Clyde Wiles, Indiana University Northwest, Gary, Indiana.

Mathematics events and conferences for students are relatively new to Indiana. College participation is evident. Programs are available at Purdue University, Indiana University, Indiana State University-Purdue University at Indianapolis, Hanover College, and the University of Louisville. Other events include quiz bowls, U.S. Mathematics Olympiad and regional science fairs.
events include quiz bowls, U.S. Mathematics Olympiad and regional science fairs.

At Purdue University, Super Saturday Mini-Courses for Able Students are designed to serve students who are high achievers and/or have high potential in intellectual-academic or in creative-artistic abilities. Each semester Super Saturday serves over 200 students, ages preschool through high school. Classes are offered in mathematics and computer science, along with several other areas.

Appendix

Indiana Department of Public Instruction/Indiana Council of Teachers of Mathematics

Survey of the Status of Elementary School Mathematics in Indiana

DIRECTIONS: Please complete the following survey as a total picture for all of the elementary schools in your corporation. Return to Dr. Don S. Balka, Saint Mary's College, Notre Dame, IN 46556, by October 2, 1981, if possible. Feel free to make any additional comments which clarify or expand your answers.

I. General Information

1. Corporation _____ 2. County _____
3. Contact Person _____
4. Position _____ 5. Phone _____
6. Number of elementary schools in your corporation _____
7. Grades in school _____ 8. Approximate total enrollment _____
9. Total number of teachers _____ 10. Number of Math Specialists _____
11. Does your corporation have an elementary mathematics coordinator? _____

II. Mathematics Contests and Conferences

12. Does any elementary school in your corporation have a mathematics team? _____
    A. If yes, does the team participate in a league? _____
    B. If yes, is an advisor paid? _____
    C. List the contests that your school participated in during the 1980-81 school year.
13. Does any school in your corporation participate in any calculator contests? _____
    Comments: _____
14. Does any school in your corporation participate in any computer contests? _____
    Comments: _____
15. Does any school in your corporation sponsor a math fair? _____
    Comments: _____
16. Do your schools participate in any other special mathematics events designed for students?
    Comments: _____

III. Computers and Microcomputers

17. Does your corporation have a computer(s) for educational use? _____
    A. If yes, what type of computer is it? _____
    B. For what purpose(s) is the computer used? _____
    C. How is instruction provided? _____
    D. What computer language is used? _____
    E. How many terminals do you have? _____
    F. Does your corporation or school have a definition of "Computer Literacy?" _____
    (If yes, please attach a copy to the survey.)
    G. Comments: _____

IV. Calculators

18. Are students allowed to use calculators in mathematics classes? _____

19. Does your corporation have any written policy concerning the use of calculators? _____
(If yes, please attach a copy to the survey.)
Comments: _____

20. Does your corporation own calculators for student use? _____
A. If yes, how many? _____
B. If yes, what type? _____
C. If yes, for what purpose(s) are the calculators used? _____
Comments: _____

V. Curriculum

21. Does your corporation have any new and/or creative mathematics programs that have been successful? _____
Comments: _____

22. Does your corporation have special programs for gifted students in mathematics? _____
Comments: _____

23. Does your corporation have remedial programs in mathematics? _____
Comments: _____

24. Does your corporation have access to a copy of the 1977 Mathematics Guidelines from the Indiana Department of Public Instruction? _____
Comments: _____

VI. Miscellaneous

Please list areas of concern for which you would like the State Mathematics Consultant to be able to supply information, should you have a need to contact him. _____

Indiana Department of Public Instruction/Indiana Council of Teachers of Mathematics

Survey on the Status of Middle/Junior High School Mathematics in Indiana

DIRECTIONS: Please complete the following survey as a total picture for all of the middle/junior high schools in your corporation. Return to Dr. Don S. Balka, Saint Mary's College, Notre Dame, IN 46556, by October 2, 1981, if possible. Feel free to make any additional comments which clarify or expand your answers.

I. General Information

1. Corporation _____ 2. County _____
3. Contact Person _____
4. Position _____ 5. Phone _____
6. Number of middle/junior high schools in your corporation _____
7. Grades in school _____ 8. Approximate total enrollment _____
9. Number of Math Specialists _____ 10. Number of math classes _____
11. Does your corporation have a middle/junior high mathematics coordinator? _____
12. Has your corporation experienced a shortage of certified mathematics teachers at the middle/junior high level? _____
    Comments: _____
13. Average number of students in regular classes _____
14. Average number of students in remedial classes _____
15. Average number of students in honors classes _____

II. Mathematics Contests and Conferences

16. Did your school corporation compete in the National High School Mathematics Contest last year? _____
17. Does your school corporation have a mathematics team? _____
    A. If yes, does the team participate in a league? _____
       Comments: _____
    B. If yes, is an advisor paid? _____
18. List the contests that your school corporation participated in last year:
19. Did your school corporation participate in any calculator contests? _____
    Comments: _____
20. Did your school corporation participate in any computer contests? _____
    Comments: _____
21. Does your school corporation have a mathematics club? _____
22. Does your school corporation have a chapter of Mu Alpha Theta? _____
23. Is your school corporation interested in reviving a state mathematics contest? _____
    Comments: _____
24. Did any of your students participate in any other special mathematics events designed for students? _____
    Comments: _____

III. Computers

25. Does your school corporation have a computer(s) for educational use? _____
    A. If yes, what type of computer is it? _____
    B. If yes, what is the language taught? _____
    C. If yes, for what purpose(s) is the computer used? _____
26. Does your school corporation offer a computer course? _____
    (If yes, attach a course syllabus to the survey. Include course length, prerequisites, etc.)
27. Does your school corporation have a definition of computer literacy? _____
    If yes, please attach a copy to the survey.
    Comments: _____

IV. Calculators

28. Are students allowed to use calculators in mathematics classes? _____
    Comments: _____
29. Does your corporation have any written policy concerning the use of calculators? _____
    (If yes, please attach a copy to the survey.)
    Comments: _____
30. Does your corporation own calculators for student use? _____
    A. If yes, how many? _____
    B. If yes, what type? _____
    C. If yes, for what purpose(s) are the calculators used? _____
    Comments: _____

V. Curriculum

31. Does your corporation have special programs for gifted students in mathematics? _____
    Comments: _____
32. Do you have any new and/or creative mathematics programs that have been very successful? _____ Comments: _____
33. Does your department have a printed curriculum guide? _____ Date: _____
34. Does your department have access to a copy of the 1977 Mathematics Guidelines from the Indiana Department of Public Instruction? _____
35. Do any of your students take mathematics courses at nearby colleges or universities? _____ Comments: _____
36. Is Algebra I offered for your students? _____
    A. If yes, what grade? _____
    B. If yes, how are students selected for the course? _____
37. Is Geometry offered for your students? _____
    A. If yes, what grade? _____
    B. If yes, how are students selected for the course? _____
38. Is the transformational approach to geometry used in your department? _____
39. In what course(s) is trigonometry taught? _____

VI. Faculty Involvement In Professional Organizations

Organization	Number of Mathematics Teachers
40. Indiana Council of Teachers of Mathematics	
41. National Council of Teachers of Mathematics	
42. School Science and Mathematics Association	
43. NCTM affiliated group	
44. Others in Mathematics Education (List)	

VII. Miscellaneous

Please list areas of concern for which you would like the State Mathematics Consultant to be able to supply information, should you have a need to contact him. _____

VIII. Please approximate totals for the following. Circle grades appropriate for your level(s).

MATHEMATICS ENROLLMENT

	8th		9th		10th		11th		12th	
COURSES	F	M	F	M	F	M	F	M	F	M
General Mathematics										
Algebra (1-yr)										
Algebra (1st of 2-yr course)										
Algebra (2nd of 2-yr course)										
Algebra II (Adv. Alg.)										
Geometry										
Precalculus (4th yr)										
Trigonometry										
Analytic Geometry										
Probability and Statistics										
Consumer Mathematics										
Business Arithmetic										
Computer Mathematics										
Calculus										
Others:										

Indiana Department of Public Instruction/Indiana Council of Teachers of Mathematics

Survey on the Status of High School Mathematics in Indiana

DIRECTIONS: Please complete the following survey as a total picture for all of the high schools in your corporation. Return to Dr. Don S. Balka, Saint Mary's College, Notre Dame, IN 46556, by October 2, 1981, if possible. Feel free to make any additional comments which clarify or expand your answers.

I. General Information

1. Corporation _____ 2. County _____
3. Contact Person _____
4. Position _____ 5. Phone _____
6. Number of high schools in your corporation _____
7. Grades in school _____ 8. Approximate total enrollment _____
9. Number of math teachers _____ 10. Number of math classes _____
11. Does your corporation have a high school math coordinator? _____
12. Do department chairpersons in your corporation receive a reduced teaching load? _____
    Comments: _____
13. Do department chairpersons in your corporation receive additional compensation? _____
    Comments: (If possible state how much) _____
14. Has your corporation experienced a shortage of certified mathematics teachers at the high school level? _____
15. Average number of students in regular classes _____
16. Average number of students in remedial classes _____
17. Average number of students in honors classes _____

II. Mathematics Contests and Conferences

18. Did your school corporation compete in the National High School Mathematics Contest last year? _____
19. Does your school corporation have a mathematics team? _____
    A. If yes, does the team participate in a league? _____
    Comments: _____
    B. If yes, is an advisor paid? _____
20. List the contests that your school corporation participated in last year:
    _____
    _____
    _____
21. Did your school corporation participate in any calculator contests? _____
    Comments: _____
22. Did your school corporation participate in any computer contests? _____
    Comments: _____
23. Does your school corporation have a mathematics club? _____
24. Does your school corporation have a chapter of Mu Alpha Theta? _____
25. Is your school corporation interested in reviving a state mathematics contest? _____
    Comments: _____
26. Did any of your students participate in any other special mathematics events designed for students? _____
    Comments: _____

III. Computers

27. Does your school corporation have a computer(s) for educational use? _____
    A. If yes, what type of computer is it? _____
    B. If yes, what is the language taught? _____

C. If yes, for what purpose(s) is the computer used? _____

28. Does your school corporation offer a computer course? _____
(If yes, attach a course syllabus to the survey. Include course length, prerequisites, etc.)
29. Does your school corporation have a definition of computer literacy? _____
(If yes, attach a copy to the survey.)
Comments: _____

IV. Calculators

30. Are students allowed to use calculators in mathematics classes? _____
Comments: _____

31. Does your corporation have any written policy concerning the use of calculators? _____
(If yes, please attach a copy to the survey.)
Comments: _____

32. Does your corporation own calculators for student use? _____
A. If yes, how many? _____
B. If yes, what type? _____
C. If yes, for what purpose(s) are the calculators used? _____
Comments: _____

V. Curriculum

33. Does your corporation have special programs for gifted students in mathematics? _____
Comments: _____

34. Do you have any new and/or creative mathematics programs that have been very successful? _____ Comments: _____

35. Does your department have a printed curriculum guide? _____ Date: _____
36. Does your department have access to a copy of the 1977 Mathematics Guidelines from the Indiana Department of Public Instruction? _____
37. Do any of your students take mathematics courses at nearby colleges or universities? _____ Comments: _____

38. Do you offer Advanced Placement Calculus? _____
A. If yes, give the approximate number of students enrolled. _____
B. If yes, how are students selected for the course? _____

39. Indicate the college preparatory sequence followed by most students: _____

40. Do you offer a modified college preparatory sequence? _____
Comments: _____

41. Is the transformational approach to geometry used in your department? _____
42. In what course(s) is trigonometry taught? _____
43. Does your school corporation have a minimum mathematics requirement for graduation? _____ If yes, what is it? _____

44. Briefly describe by topics the content of your top level mathematics course:

45. Briefly describe your non-college preparatory mathematics program:

VI. Faculty Involvement In Professional Organizations

Organization	Number of Mathematics Teachers
46. Indiana Council of Teachers of Mathematics	
47. National Council of Teachers of Mathematics	
48. School Science and Mathematics Association	
49. NCTM affiliated group	
50. Others in Mathematics Education (List)	

VII. Miscellaneous

Please list areas of concern for which you would like the State Mathematics Consultant to be able to supply information, should you have a need to contact him.

VIII. Please approximate totals for the following. Circle grades appropriate for your level(s).

MATHEMATICS ENROLLMENT

COURSES	8th		9th		10th		11th		12th	
	F	M	F	M	F	M	F	M	F	M
General Mathematics										
Algebra (1-yr)										
Algebra (1st of 2-yr course)										
Algebra (2nd of 2-yr course)										
Algebra II (Adv. Alg.)										
Geometry										
Precalculus (4th yr)										
Trigonometry										
Analytic Geometry										
Probability and Statistics										
Consumer Mathematics										
Business Arithmetic										
Computer Mathematics										
Calculus										
Others:										