

a n n u a l **IMSA** r e p o r t
99-00

Illinois Mathematics and Science Academy

o u r

VISION

To create a learning enterprise that liberates the genius
and goodness of all children and invites and inspires the
power and creativity of the human spirit for the world.



IMSA social science teacher Dr. Christian Nokkentved confers with IMSA student Shefali Mathur following class.



d e a r i m s a
SHAREHOLDERS

STRATEGIC INITIATIVES

For Internal Teaching and Learning Programs

Student Inquiry and Research
 Student Leadership Development
 Scientific Inquiries

For External Public Policy and Service Programs

Standards-Based Education: IMSA 2061
 Problem-Based Learning Network (PBLN@IMSA)
 Alternative Certification

For Both Internal and External Programs

On-Line Learning
 Great Minds Program
 IMSA Kids Institute
 Historically Underrepresented Populations

We are pleased to share with you the 1999-00 annual report of the Illinois Mathematics and Science Academy. IMSA's 14th year was characterized by the continued evolution of our dynamic Business Plan, and the advancement of our Strategic Initiatives (see chart at left).

Goals and Indicators of Success are articulated for each Strategic Initiative, enabling IMSA to measure its progress toward achieving its vision and strategic goals.

In December 1999, the work of The Center@IMSA received a tremendous boost when U.S. House Speaker Dennis Hastert and U.S. Representative Rod Blagojevich visited IMSA to announce the release of a \$3.6 million grant from the U.S. Department of Education. The grant, to be shared by IMSA (\$1.6 million) and the Chicago Public Schools (\$2.0 million), will support programs designed to increase the number of well qualified teachers for the 21st Century.

It is reaffirming to know that the nation is looking to IMSA and our innovative programs to help lead the charge in recruiting, preparing and retaining exemplary mathematics and science teachers. This is key to improving student achievement in mathematics and science for the benefit of Illinois and our nation.

Sincerely,

John H. McEachern Jr.
 Chairman

Stephanie Pace Marshall, Ph.D.
 President



Members of IMSA's Madrigal singers perform for guests at the IMSA Open House in December, 1999.

YEAR

a t - a - g l a n c e

99-00

Academic Programs

- Expanded Student Inquiry and Research programs for students to pursue compelling questions of interest, conduct original research, create and invent products and services, and participate in professional presentations and publications.
- Expanded Student Leadership Development programs for students to develop as ethical leaders.
- Developed Scientific Inquiries, a new science program for IMSA students to begin Fall 2000.
- Expanded the IMSA Great Minds Program, led by Nobel Laureate and IMSA Resident Scholar Dr. Leon Lederman. Some of the world's foremost authorities visited IMSA to share their knowledge with IMSA students and staff, other Illinois educators and students, and the general public.

Student Achievements

- Presentations at Sakharov's Readings in Russia, American Association for the Advancement of Science, National African American Studies Conference, Illinois State Microbiology Conference, Illinois Junior Science and Humanities Symposium, and the Illinois Student Technology Conference.

- Publication in professional journals such as the *Biology of Reproduction*, the *NCSSMST Journal*, *Biographies 2000: Through the Years* (published by the Lee County, IL. Genealogical Society in October, 2000), and the book *Scientists Who Shaped the Past Creating the Future* (in preparation).
- 43 National Merit semifinalists, three National Achievement semifinalists, two National Hispanic finalists.
- Numerous awards in academic competitions including the national Mandelbrot Competition, Illinois History Exposition, National Knowledge Master Open, National Russian Essay Contest, National German and Spanish Exams, Illinois Scholastic Bowl, United States Mathematical Olympiad, the Future Problem-Solving Bowl International Conference, U.S. Physics Team, High School Mathematical Contest in Modeling and IHSA State Organizational Contest.
- Two Midwestern Regional Finalists in the national Siemens-Westinghouse Science & Technology Competition.

An IMSA student assists visiting high school students in a hands-on DNA laboratory experiment following the Great Minds Program dialogue "Science, Law & Technology." During the experiment, students performed bacterial transformation, inserting a gene which resulted in the bacteria glowing in the dark.

Programs and Services for Illinois Teachers and Students

- Sponsored professional learning opportunities in problem-based learning, earth and space science, classroom action research, Mathematica software workshop and T3 TI Calculator workshop.
- Expanded IMSA's Internet Toolkit training to librarians in schools throughout East Central Illinois. The Toolkit is part of IMSA's Internet Information Fluency Project.
- Science Explorers On-the-Road and field trip experiences for approximately 600 3rd, 4th and 5th grade students in Illinois and Washington, D.C. taught by IMSA students.
- IMSA students designed and developed the *Real Science 2000* CD-ROM for 3-5th graders which was distributed free to 350 Chicagoland schools.
- Hosted the Great Minds Program Dialogue *Science Education in the 21st Century* featuring national science education curriculum experts and attended by more than 130 Illinois high school science teachers and administrators.

Special Events

- Hosted the 13th Annual Professional Conference of the National Consortium for Specialized Secondary Schools of Mathematics, Science and Technology, featuring keynote speakers Robert Galvin, chairman of the executive committee, Motorola, Inc., Benjamin Zander, conductor, Boston Philharmonic Orchestra, and Dr. Paul Sereno, world-renowned paleontologist.
- Held ribbon-cutting ceremony for the Grainger Center for Imagination and Inquiry.
- Hosted the second IMSA Alumni Association LUMEN Weekend.
- Eighth annual Richard L. Horwitz Lecture on Ethics featuring Rabbi Lawrence Kushner.
- Commencement of the 191-member Class of 2000, featuring Commencement speaker Dr. Mae C. Jemison, the first African American female astronaut to travel into space, and student speakers Donielle Newell of Naperville and Mathew Blaine Eubanks of Eldorado.



Leadership Investments

- \$14.3 million in operating funds by the State of Illinois to support IMSA's residential/academic program and statewide service programs.
- \$1.3 million in gifts by corporations, foundations, individuals, and competitive government grants and contracts, to the IMSA Fund for Advancement of Education to support various initiatives.
- \$1.6 million from the U.S. Department of Education to support the IMSA-Chicago Public Schools Consortium and other initiatives designed to increase the number of well qualified teachers for the 21st Century.
- \$50,000 from the Illinois Department of Commerce and Community Affairs (IDCCA) to support further dissemination of IMSA's Internet Toolkit to Illinois educators.
- \$30,000 from the City of Aurora to support the programs of the IMSA Kids Institute.
- \$25,000 from Ameritech Illinois to support IMSA's Minority Recruitment and Retention Program.
- \$20,000 from the Lumpkin Foundation to support IMSA's Internet Toolkit project.



(1) INITIATIVES

Serving IMSA Students and Staff

In 1999-00, IMSA continued to refine the Business Plan, focusing on students' development as ethical learners and leaders, and highly skilled inquirers and researchers. Strategic initiatives that expanded included Student Inquiry and Research, Scientific Inquiries and Student Leadership Development.

STUDENT INQUIRY & RESEARCH

In Student Inquiry and Research (SIR), students work independently and collaboratively with their peers, practicing scientists and scholars. Learning experiences foster the development of students as highly skilled and integrative problem finders, problem solvers, and apprentice investigators, all skills required to succeed in the global workplace of the 21st Century.

Program Goals

- Build the capacity of students to design and carry out self-directed learning experiences that develop the habits of mind of an integrative learner.
- Help students become skeptical "inquirers" who work at increasingly higher levels of independence, guided by professionals knowledgeable in their fields.
- Encourage active student questioning, investigation and presentation that contributes to a community of learners.

Following the opening of the Grainger Center for Imagination and Inquiry in the fall of 1999, opportunities for students to conduct research on campus greatly expanded.

The Grainger Center includes multi-functional mobile and fixed workspace for independent and collaborative research, and specialized hardware and software for research and experiments that require high level recording of complex data.

At IMSA, students participate in the SIR Program through mentorship, an interactive research partnership, self-directed Student Plans of Inquiry, and IMSA Courses.

1999-00 Student Inquiry and Research Highlights

- Rebecca Elsenheimer ('00) received the highest recognition given at Sakharov's Readings (*see photo above*), a highly selective research conference in St. Petersburg, Russia. Elsenheimer's research work focused on the birth of the solar system.
- 19 students attended and presented at the 2000 American Junior Academy of Science (AJAS)/ American Association for the Advancement of Science (AAAS) Annual Meeting.
- Jason Chang ('00) presented *Localization of the Nuclear Transport Machinery in Hela Cells During Drug Treatment* at the Junior Science and Humanities Symposium and Loretta Li ('00) presented *Analysis of the MLL Breakpoint Cluster Region to Identify Sequence Polymorphisms* at the Junior Science and Humanities Symposium.
- Jennifer Leung ('00) received the 1999 Elizabeth Glaser Pediatric AIDS Foundation Student Intern Award for her research at the Children's Memorial Hospital.
- Blaine Eubanks ('00) and Dustin Hendrickson ('01) built an apparatus for sonoluminescence, generating light from sound. This phenomenon may serve as a future source for clean, efficient energy.

Mita Patel of Mattoon presents her research at Sakharov's Readings on coronary disease treatments. Standing with Patel is IMSA Russian teacher, Julia Husen.

- IMSA students designed and implemented Science Explorers, a program designed to pique the interest of middle school students in science.
- 12 IMSA students and one student from Batavia High School wrote biographies of famous living American scientists. Each interview culminated in a chapter for a book geared toward exciting middle school students about science.
- Winn Wasson ('01) explored his family's genealogy as it related to historical events such as World War I, World War II, the American Revolution, and the Civil War. His research work was published in October 2000 in *Biographies 2000: Through the Years*.
- Students in Ecology investigated the nature of vocalizations of wolves and coyotes. This led to an analysis based on computer techniques of pre-recorded sounds.
- Students in Biotechnology designed and executed projects to explore different molecular techniques for DNA cloning and examining gene expression.
- Students in General Microbiology determined antibiotic resistance, explored bacteriocidal properties of plant extracts and commercially available house-hold cleaning products, mutagenized bacteria with ultraviolet irradiation and Pasteurized milk.



- Students in American Studies determined whether there were patterns to the major wars involving the United States in the 20th Century.

SCIENTIFIC INQUIRIES

In 1999-00, IMSA designed Scientific Inquiries, a new integrative double credit, one-year science core curriculum for IMSA sophomores. Scientific Inquires integrates concepts from chemistry, physics, biology, and earth and space science. It will provide a unique model for the design and delivery of science education in other Illinois schools.

Program Goals

Grounded in research and learning theory in science, Scientific Inquiries (S.I.) has the potential to change the way students approach, learn and do science.

The goals of S.I. are to:

- Immerse students in rich science content identified by the National Science Education Standards, the Illinois Science Learning Standards and the IMSA Science Learning Standards;
- Engage students in the identification and resolution of problems which integrate the learning and doing of science;
- Inspire students to continue their interest in and study of science and technology throughout their lives;
- Support students in becoming integrative learners characterized by complex thinking skills as exemplified by IMSA's Standards of Significant Learning; and
- Challenge students to demonstrate their understanding through the use of multiple forms of assessment designed to determine whether students meet the high level of achievement set by the Academy.

Students in University Biology visit the SUE dinosaur exhibit at the Field Museum in Chicago as part of a unit on evolution.

Pilot Program Developed for 2000-01

How is the new S.I. Program different from previous IMSA science programs? Faculty believe the new program is more aligned with science standards and IMSA's mission, is more competency-driven, inquiry-based, problem-centered and integrative, and includes more earth and space science.

Scientific Inquiries program components include inquiry journey excursions (units), essential questions (questions that guide learning), enduring understandings (what's most worth knowing), evidence of understanding, assessment tasks and learning experiences (in class and out-of-class activities).

While participating in inquiry journey excursions, concepts from the physical sciences, earth and space sciences, life sciences, scientific inquiry and technology overlap to form a truly integrative experience for students. The students' growing understanding of science will be supported by a parallel mathematics-appropriate learning sequence.

Evidence of students' understanding will be determined by their ability to explain or demonstrate certain topics related to a particular inquiry journey excursion.

The six essential questions that anchor Scientific Inquiries include:

- What are scientific ways of knowing?
- What is the chemical basis underlying important Earth features and processes and the dynamics related to them?
- What is the chemical basis of life and how does life change over time?
- What is the nature of the universe?
- What are the processes that support life?
- How has the presence of mankind affected our world?

Having explored these six essential questions, students will be prepared to continue their science studies through IMSA's science elective programs, mentorship and inquiry experiences.

Assessment of Student Learning

Performance assessments used by S.I. faculty include written papers, free responses to problem-centered situations, short writes and poster presentations. In addition, students are given a multiple choice pre-and-post test to determine their content knowledge before the course begins and after it is completed.

STUDENT LEADERSHIP DEVELOPMENT

Student Leadership Development (SLD) provides students opportunities to become ethical leaders at the Academy, in the community, and beyond. Students learn through their academic course work, residence hall activities, seminar discussions, lectures, conferences and involvement in Academy and co-curricular activities, how to experience the challenge of leading others and creating a sense of belonging to a community.

Program Goals

- Embed learning standards for ethical leadership in all curricula.
- Create a comprehensive and integrated program of student ethical leadership development.
- Integrate the Sophomore experience through navigation, residence life curriculum and other experiences.
- Establish that all members of the community are service learners.

Expanded Student Leadership Development Opportunities

Students participate in the SLD Program through:

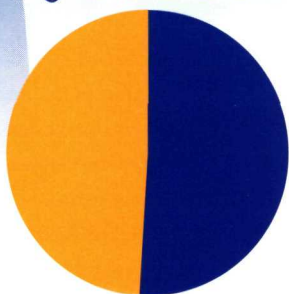
Sophomore Navigation, SYNERGY, Leadership Education and Development (LEAD), Residential Life Curriculum, Service Learning, and Co-curricular Activities.

1999-00 Student Leadership Development Highlights

- Students were required to attend at least three hours per month of programming in the evening.
- Students discussed the Elian Gonzalez case and roles the media played in interpreting the situation.
- Students participated in Dream Campus, an interactive program where students learned about the actualization of the disparity between groups and what happens when individuals and groups are treated based on assumptions and stereotypes.
- The Residence Life Curriculum was updated and submitted for external review and revised.
- Community Service was revised to reflect the current practice in application. Students were introduced to a concept of asset-based community development in which they interact with the community they serve.
- LEAD Program is introduced as a pilot peer training program for students during Intersession.

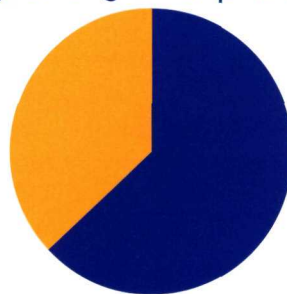
student 99-00 PROFILE

gender



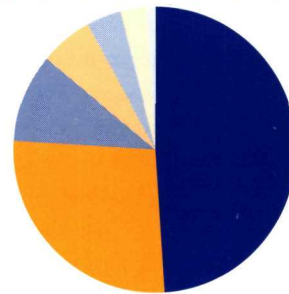
■ Male: 51%
■ Female: 49%

geography



■ Chicagoland/
Metropolitan area: 63%
■ Other areas of Illinois: 37%

ethnicity



■ White: 49%
■ Asian: 27%
■ African American: 10%
■ Latino/a: 6%
■ Bi-Racial/Multi-Ethnic 4%
■ Other/Non-Reporting: 3%
■ Native American: >1%

STUDENT TESTING HIGHLIGHTS

- Mean SAT I composite score for IMSA seniors was 1365, 346 points above the national average for college-bound seniors.
- Mean ACT composite score for IMSA seniors was 29.7, 8.7 points above the national average for college-bound seniors.
- Of IMSA juniors and seniors taking the Advanced Placement Examinations, 91% scored “3” or better and 69% scored “4” or better. Mean SAT II score for IMSA seniors taking the Mathematics-Level IIC Test was 751, 95 points above the national average for college-bound seniors. Mean IMSA score for the English Writing SAT II Test was 676, 83 points above the national average for college-bound seniors.

For more information regarding student testing, contact the College and Academic Counseling Office at (630) 907-5056 and request the IMSA Profile.



Great Minds Program speaker Alan November talks to educators during the GMP dialogue "Frontiers of Educational Technology."

(2) INITIATIVES

Serving IMSA Students, Staff and Students and Educators throughout Illinois

In 1999-00, IMSA continued to refine the strategic initiatives of IMSA's Business Plan and focus on initiatives that serve both IMSA students and staff and students and teachers throughout Illinois schools. Strategic initiatives serving these groups that expanded included: the Great Minds Program, On-line Learning, the IMSA Kids Institute and Historically Underrepresented Populations in Mathematics, Science and Technology.

GREAT MINDS PROGRAM

To "bring the best minds in the world to IMSA," IMSA launched its Great Minds Program under the leadership of Nobel Laureate and Resident Scholar Dr. Leon Lederman. It has continued to expand to offer educational programming to teachers and students throughout Illinois on campus and via distance learning technologies.

Program Goals

The goal of the Great Minds Program is to "fan the imaginations" of young people about knowledge, creativity and the possibilities of the future. The program advances IMSA's learning agenda through initiatives that raise awareness and advance leading edge educational programs in mathematics, science, the arts and humanities for young people.

Since the fall of 1998, the Great Minds Program has continued to expand.

In 1999-00 alone, IMSA reached 612 teachers and 1377 students from 270 different schools through the Great Minds Dialogue series. The dialogues provided a forum for students and teachers in schools throughout Illinois to engage with Visiting Scholars in conversations around major topics in science, technology, ethics and research. In addition to participating in the dialogues, teachers and students also had the opportunity to stay throughout the day for small group discussions and hands-on laboratory experiments.

1999-00 Great Minds Program Highlights

- More than 2,500 guests attended Great Minds Program events at IMSA and delivered to some via distance learning technologies.
- More than 1,425 Illinois students and 655 Illinois teachers from 242 middle schools, high schools and community colleges participated in a series of Great Minds Program dialogues held at IMSA. Topics included *Science and the Media*, *Frontiers of Educational Technology*, *Stories of a Scientist*, *Science, Law and Technology* and *Science Education in the 21st Century*.

Some of the guest speakers included:

- Dr. Edward "Rocky" Kolb, Astrophysicist at Fermi National Accelerator Laboratory
- Malcolm Browne, New York Times Senior Writer
- Paula Apsell, Executive Producer of the award-winning PBS television series NOVA

The IMSA Kids Institute hosted a new summer "camp" entitled Math Explorers for 50 Chicagoland 8th and 9th graders.

- Bill Kurtis, Executive Producer and host of the award-winning *Investigative Reports with Bill Kurtis*
- Dr. Marsha Rosner, Director of The Ben May Institute for Cancer Research at The University of Chicago
- Dr. Rodger Bybee, Executive Director of Biological Sciences Curriculum Study
- Dr. George "Pinky" Nelson, Director of American Association for the Advancement of Science (AAAS) Project 2061
- Ms. Lynne Haeffele, Deputy Superintendent of the Illinois State Board of Education
- Louis Gomez, Associate Professor, Northwestern University
- Mr. Alan November, Senior Partner, Educational Renaissance Planners (pictured opposite page)
- John Conway, Professor, Princeton University

More than 500 people attended Great Minds Program community lectures held at IMSA. Speakers and topics included Nobel Laureate and IMSA Resident Scholar Dr. Leon Lederman (*Science in the 21st Century: Issues and Predictions*), Nobel Laureate Dr. Mario Molina (*The Science and Politics of Climate Change*) and Rabbi Lawrence Kushner (*Invisible Lines of Connection: Social Responsibility and Cowardice*).

Great Minds Science Biographies Project

Dr. Lederman worked with 14 IMSA students and one student from Batavia High School in a project that will culminate in a book of biographies of famous American scientists aimed at exciting middle school students about science. Student have researched the science, interviewed the scientist and have written a chapter for a book tentatively titled *Scientists Who Shaped the Past Creating the Future*. The book is scheduled for release in the fall of 2001 through Prometheus Books.



IMSA KIDS INSTITUTE

The IMSA Kids Institute was launched in the fall of 1998 to help increase the number of students interested in science and technology. Programs are developed and taught by IMSA students and staff and are targeted to other Illinois students in grades 3-9. Most of the programs feature hands-on enrichment activities that integrate concepts of science, mathematics and technology with the humanities. In addition to serving other Illinois students, the IMSA Kids Institute also helps IMSA students gain leadership experience and introduce teaching as a possible career choice.

Program Goals

The goal of the IMSA Kids Institute is to develop IMSA students as leaders while exposing them to the challenge and rewards of teaching. IMSA students gain valuable leadership experience by developing and distributing products and services that they helped to create, including the *Real Science* CD-ROM.

IMSA students and other Illinois educators and students can participate in the IMSA Kids Institute through Science Explorers, Math Explorers, Science Explorers On-the-Road, Explorations in Biotechnology, Summer Sleuths, and the Real Science CD-ROM.

1999-00 IMSA Kids Institute Highlights

- Programs greatly expanded to serve almost 300 Illinois students in the summer and 600 students during the school year.
- The IMSA Kids Institute hosted two new summer "camps". In Math Explorers, more than 50 Chicagoland students cracked codes using cryptography, constructed mobiles using geometry principles, designed fractals on computers and played mathematical games using logic during the program.



In Explorations in Biotechnology, sponsored by the Chicago Public Schools, students from seven Chicago schools worked in the Grainger Center on bacterial transformation, DNA spooling, polymerase chain reaction, restriction enzyme analysis, and gel electrophoresis of proteins. The final day, students presented posters about medical advances related to biotechnology; their topics included AIDS, Downs Syndrome, sickle cell anemia, and breast cancer.

The Kids Institute hosted two sessions of the third annual Science Explorers Program. In the first session, elementary students studied topics such as Environmental Science, Spectacular Stars, Geology and Fossils, Natural Disasters and Movie Magic.

In the second session, students used a problem-centered approach to establish a colony on Mars in the year 2030. Students investigated and resolved transportation, industry, food and supplies and community issues. Students then made poster presentations at the end of the week.

- In Summer Sleuths more than 80 Illinois students tackled the problem, Resident Canada Geese: Sharing the Environment, in which they considered the viability of genetic engineering as a means to alleviate the nuisances associated with the over-population of geese in a suburban environment.
- 350 Illinois schools each received a copy of the 1999 edition of the *Real Science* CD-ROM, funded in part by Nortel Networks. *Real Science* is an interactive science CD entirely produced by IMSA students for Illinois 3rd-5th grade classrooms.

For a free copy of the *Real Science* 2000 CD-ROM, contact Kathleen Long at 630.907.5041 or email klong@imsa.edu.

ON-LINE LEARNING

The Internet now makes it possible for students and their teachers to use powerful new information technology to improve learning and teaching. The challenge is to ensure that teachers and students acquire the knowledge and skills to locate, evaluate and use information from the Internet to improve learning and teaching and to better prepare students for the future. In addition to playing a key leadership role in the development of a statewide Illinois Virtual High School, IMSA has also developed a powerful set of information tools and resources, the Internet Toolkit, to promote the integration of technology "fluency" into educational environments at all levels.

Program Goals

- Increase students' ability to use electronic information and learning resources.
- Increase the ability of teachers to locate, evaluate and integrate electronic information into learning experiences for themselves and their students.
- Leverage and sustain increases in teachers' ability to use electronic information and learning resources to improve student achievement.

IMSA students and other Illinois educators and students can participate in On-Line Learning Programs through the Internet Toolkit Project, The Center@IMSA Website, IMSA Academic Program Websites, and real-time off-site learning events.

1999-00 On-Line Learning Highlights

- Internet Toolkit teacher training was expanded to include 30 teachers in 10 Chicago schools.
- A grant from the Lumpkin Foundation enabled us to expand Internet Toolkit training to serve 10 librarians from 10 schools in East Central Illinois.
- A grant from the Illinois Department of Commerce and Community Affairs will allow IMSA's Internet Toolkit to go online in 2001 to give 50 Illinois teachers and librarians "anytime and anyplace" access to training in the use of IMSA's Internet Toolkit in their classrooms.
- Expanded Great Minds programming to serve high schools throughout central Illinois.
- IMSA staff member co-chaired the planning committee for the Illinois Virtual High School project.

HISTORICALLY UNDERREPRESENTED POPULATIONS IN MATHEMATICS, SCIENCE AND TECHNOLOGY

Enrollment at our nation's colleges and universities and the workforce in the fields of mathematics, science and technology do not adequately reflect the diversity of our society. IMSA pre-admissions enrichment programs for students in grades 7-9 and retention programs for students already enrolled at IMSA are designed to nurture these populations so that they will be afforded an early opportunity for success that will prepare them for continued study, careers, and contributions to the community, state and world.

Program Goals

- Build a comprehensive and integrated program for minority student recruitment and retention.
- Create a greater balance in the applicant pool.
- Improve success rates at IMSA for underrepresented minority students.
- Create greater equity in participation rates in research activities, advanced mathematics and science courses and use of information technology.
- Increase diversity in IMSA staff.

IMSA students and other prospective Illinois students can participate in programs for Historically Underrepresented Populations through the Summer Enrichment for Academics in Mathematics and Science (SEAMS) Program, the Early Involvement Program (EIP), EXCEL, the Tutor Model Program (TMP), the Community Awareness Program, and Project School Visit.

1999-00 Recruitment and Retention Program Highlights

- 34 underrepresented Chicagoland minority students in 9th grade participated in the three-week SEAMS summer residential enrichment Program.
- 54 underrepresented Chicagoland and East St. Louis students in 9th grade participated in the six-week Saturday EIP Program.
- 46 IMSA sophomores (selected underrepresented minorities and others enrolled at IMSA) participated in the three-week summer and year long EXCEL Program.
- 33 IMSA students and 14 minority professional mentors participated in the weekly Tutor Model Program.



- A variety of Community Awareness Programs were held including Storytellers, which provided activities for the IMSA community such as movie night and discussion, staff dinner, acts of kindness week and an alumni tea. In addition, several student groups held a variety of multicultural programs and celebrations for students and staff including the Harvest Moon Festival, Latina Carnival, AfroPuff lock in, Divali Celebration and Kwanza Celebration.
- 14 Chicagoland schools with underrepresented student populations in 7th and 8th grade visited IMSA for one-day field trips to experience Academy life as part of Project School Visit.

Great Minds Program Speaker Dr. Marsha Rosner presents "Science, Law & Technology" to a sold-out crowd.



(3) INITIATIVES

Serving Students and Educators
throughout Illinois

In 1999-00, IMSA continued to refine the strategic initiatives of the Business Plan, focusing on initiatives that serve students and educators throughout Illinois. Strategic initiatives primarily serving Illinois students and educators that expanded or were introduced included: the Problem-Based Learning Network (PBLN@IMSA), Standards-Based Education: IMSA 2061, Alternative Certification and IMSA Excellence 2000.

PROBLEM-BASED LEARNING NETWORK (PBLN@IMSA)

IMSA's Problem-Based Learning Network provides training and support to teachers as they use problem-based learning (PBL) to improve student achievement. The PBL Network builds on IMSA's pioneering work in adapting the PBL medical education model to elementary and secondary education. Through PBL, students learn to solve real-world "messy" problems, communicate, use technology, collaborate, and interact with others in ethical ways.

Program Goals

- Increase the competence of teachers in teaching science content knowledge and skills, scientific inquiry, data analysis and reporting, and interrelated issues of science, technology and society.
- Leverage and sustain increases in teachers' competence in using PBL to improve student achievement in science, mathematics and technology.

Illinois students and teachers can participate in the Problem-Based Learning Network@IMSA through the Neison and Bette Harris Design Institute, the Summer Sleuths Coaching Institute, the Problem-Based Learning Seminars, the Project Keystone Design Institutes, The Center@IMSA Resource Center, and ASCD's PBL Net.

1999-00 Problem-Based Learning Network Highlights

- 61 Illinois educators (and one from Singapore) participated in the four-day summer Neison and Bette Harris Design Institute for problem-based learning.
- 192 Illinois educators from 79 educational institutions in 22 Illinois counties participated in a variety of one-day and two-day Project Keystone Design Institutes held throughout the state.
- 220 educators nationwide from 200 educational institutions participated in ASCD's PBL Net and 215 educators from 200 institutions subscribe to the Problem-Based Learning Listserv.
- 100 educators throughout Illinois and in Houston, Texas, participated in problem-based learning seminars through district-level contracts with IMSA.
- 280 teachers throughout the nation attended problem-based learning sessions presented by IMSA staff at professional conferences.

IMSA hosted the Great Minds Program Dialogue "Science Education in the 21st Century" featuring national science education curriculum experts and attended by more than 130 Illinois high school science teachers and administrators.



STANDARDS-BASED EDUCATION: IMSA 2061

IMSA and the American Association for the Advancement of Science's Project 2061 have established a unique partnership. IMSA 2061 provides customized and results-oriented professional development programs in standards-based education practices for mathematics and science teachers, education leaders and schools. These learning experiences build the capacity of teachers and schools to enable more students to meet and exceed state and national standards in mathematics and science. Through IMSA 2061, teachers learn to use the tools, research and experiences of education reform to improve student learning—tools to rethink curriculum and to align it with standards and research on student learning and strategies to maximize student learning. IMSA 2061 tracks the impact of professional development on classroom and school-wide practices and their effects on student achievement.

Program Goals

- Increase the ability of mathematics and science teachers to understand and use the tools, research and experiences of education reform to improve student achievement.
- Leverage and sustain the increases in teacher competence to improve student achievement in mathematics and science.

IMSA 2061: Reaching Illinois Students through Better Teachers

In the fall of 2000, IMSA officially launched its IMSA 2061 program targeted to school districts throughout Illinois which are currently involved in a major reform effort focused on mathematics, science and technology.

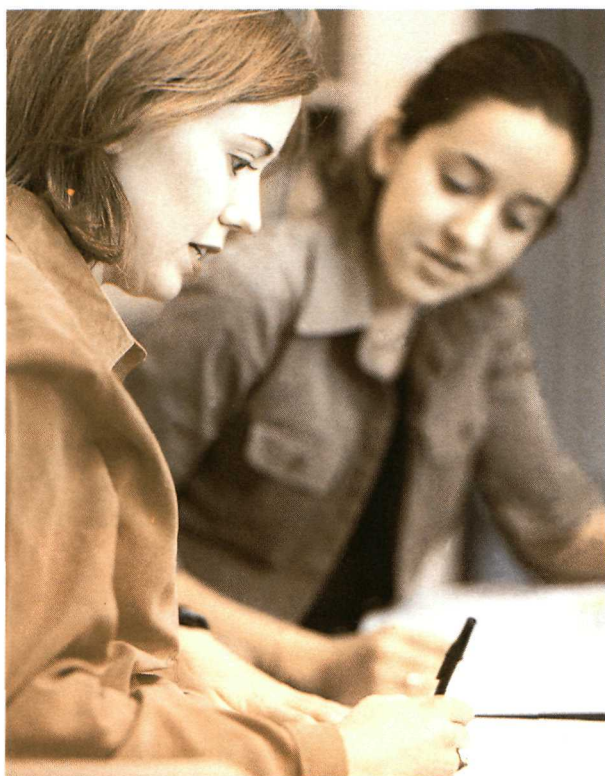
IMSA 2061 is one key strategy to reaching Illinois students through better teachers and addresses several problems with the current state of mathematics and science education including:

- An achievement problem – nearly one-half of Illinois students are not meeting Illinois learning standards in mathematics and science;
- A workforce quality problem – teachers are not well-prepared to enable ALL students to meet state standards;
- A workforce supply problem – more than 25% of Illinois middle and secondary school mathematics and science teachers lack the academic preparation for certification in the subject areas they teach and current preparation rates will not improve this situation.

IMSA 2061 is the only partnership of its kind with AAAS Project 2061. In 1985, AAAS launched Project 2061 to guide the national reform of K-12 education in science, mathematics and technology. Beginning in 1992, Project 2061 has conducted hundreds of professional development workshops with K-12 teachers, administrators and university faculty focused on standards-based education reform.

Pilot Program Developed for 2000-2001

Unlike nearly all teacher development programs that are episodic without ongoing support, IMSA 2061 takes a systemic approach to teacher professional development by: training critical masses of teachers at designated sites, supporting implementation of new materials and teaching strategies, and evaluating and reporting the impact on student achievement.



Through IMSA 2061 Professional Development Programs, educators will examine and understand how to use tools of education reform, and acquire and apply skills to analyze learning materials to determine how they fit a curriculum designed to help students achieve Illinois and national learning standards.

Program Evaluation

IMSA 2061 will be evaluated based on improved student achievement and on practices of individual teachers and local schools to maximize and sustain improvement in learning and teaching of mathematics and science.

Using the Illinois Standards Achievement Test and other indicators of achievement and success, the following questions will be answered:

- What difference are teachers making in student learning?
- What is IMSA 2061 doing that makes a difference in changing teachers' and schools' decisions and actions to improve student learning?

In addition to IMSA 2061 partnerships, future plans call for the development of IMSA 2061 online professional development courses.

ALTERNATIVE CERTIFICATION

The Alternative Teacher Certification Program in Science, a partnership between IMSA and Benedictine University in Lisle, Illinois, will provide unique and accelerated preparation for middle and secondary school teachers. Designed for science professionals with at least five years of work experience, candidates immerse in an intensive preparation program followed by a paid, year-long and mentored teaching residency in a local school. Successful candidates receive Illinois teacher certification and endorsement from IMSA based on their ability to implement standards-based learning experiences that foster inquiry, problem-solving and making connections within and among mathematics, science and real-world situations. New teachers will remain connected to IMSA for continuing professional development during their critical induction years. From their experience, IMSA will develop a replicable teacher preparation model that can be shared with other college and university partners.

Program Goals

- Increase the number of well-qualified teachers of mathematics and science.
- Retain alternative certification candidates in teaching for five years.

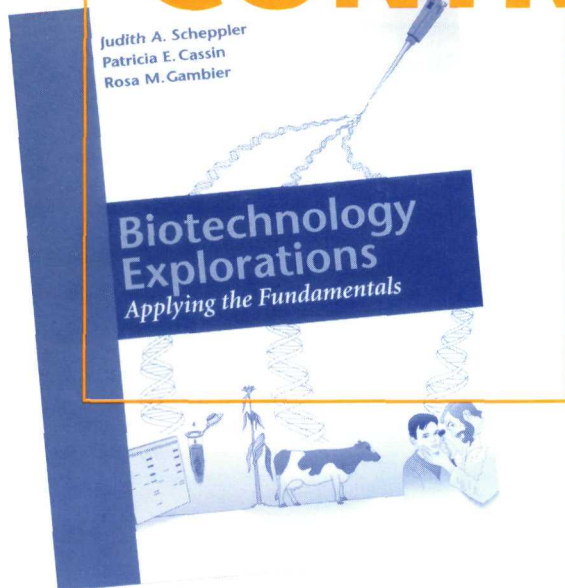
Pilot Program Developed for 2000-2001

The first cohort of 20 candidates are scheduled to begin the program in 2001. Through the Alternative Teacher Certification Program, cohort members will immerse in an intensive, problem-based, spring/summer preparation program that includes an orientation to problem-based learning, an intensive training period that offers strong grounding in a pedagogical knowledge and practice teaching under the auspices of a master teacher/coach.

Following the intensive summer program, participants are placed in full-time, mentored positions teaching science at the middle or high school levels. Upon successful completion of the program and endorsement by university, IMSA and district personnel, cohort members receive an initial teaching certificate from the State of Illinois, the IMSA endorsement, opportunities for continued graduate coursework at BU and continued support through professional development opportunities at the Center@IMSA.

professional CONTRIBUTIONS

of IMSA Staff
Benefit Education



One way the Illinois Mathematics and Science Academy serves the educational community in Illinois and beyond is through the professional contributions of its faculty and staff.

Presentations, publications and special projects sometimes are part of staff members' assigned roles and responsibilities.

However, many staff go beyond what is required, giving generously of their time, expertise and talent to better education in Illinois and beyond. Examples of professional contributions by IMSA staff in 1999-2000 include:

Dr. Stephanie Pace Marshall, *President*, was named to the National Academy of Sciences Committee for the Study of Programs for Advanced Study of Mathematics and Science in American High Schools. Nobel Laureate and Resident Scholar **Dr. Leon Lederman** presented Science Education Research on IMSA's Great Minds Program at the National Association for Research in Science Teaching Conference.

Susan Eddins helped write the *Principles and Standards for School Mathematics* (2000), the update of the original National Council of Teachers of Mathematics Standards (1989).

Dr. Raymond Dagenais was the principal author of the chapter *The Emeritus Teacher* in the book *Life Cycle of the Career Teacher*.

Dr. Judy Scheppler co-authored the book *Biotechnology Explorations: Applying the Fundamentals*.

Chuck Hamberg was a member of the AYA/Mathematics Standards Committee for the National Board for Professional Teaching Standards. His colleague **Ruth Dover** presented *Logistic Differential Equations* at this year's National Council of Teachers of Mathematics Annual Meeting.

Matthew Wicks co-chaired the Illinois Virtual High School Steering Committee.

Dr. Peggy Connolly presented *Creating Power from Potential: Young Women Scientists & Scholars* at the Women's Leadership Institute Symposium.

Willa Shultz led a National Coalition Building Institute Diversity Workshop for The Institute for Educational Leadership. Her colleague **John Stark** served on the editorial board of *The Unterrichtspraxis*, a journal devoted to applied linguistics and the teaching of German.

Dalia Bach led a session for choral educators at the American Choral Directors Association Annual State Conference. Wellness Team members **Barbara Baber**, **John Martin** and **Nancy Todnem** presented the Wellness standards-based curriculum to the Naperville Central High School health and physical education staff. The editor of the society newsletter *News and Notes*, **Dr. Christian Nokkentved** served on the executive council of the Society for the Advancement of Scandinavian Studies.

Sandee Donahue served as chair of the Illinois Library Association (ILA) Awards Committee.

Marti Guarin represented public libraries at the American Library Association's 35th Annual Legislative Day in Washington, D.C.

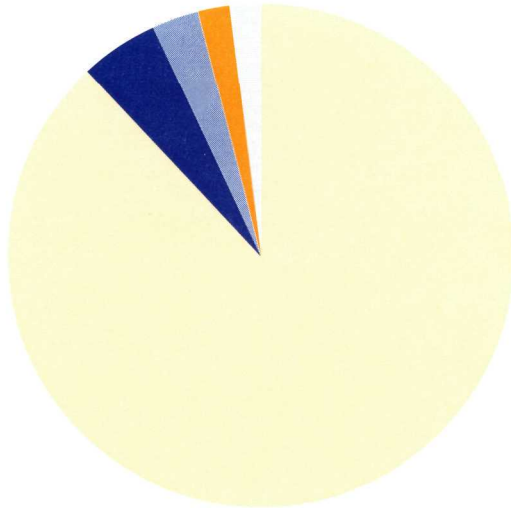
Vicki Burgholzer presented a hands-on demonstration of biodiversity at Our Lady of the Wayside School in Arlington Heights, Illinois.

At the American Association for College Registrars and Admission Officers annual convention, **Sandi Miller** facilitated several sessions dealing with high school issues and federal record keeping regulations.

f i s c a l y e a r 2000 INVESTMENTS

To receive a copy of the 1999–00 IMSA Fund Annual Report, contact the Office of Institutional Advancement and Public Policy at (630) 907-5040.

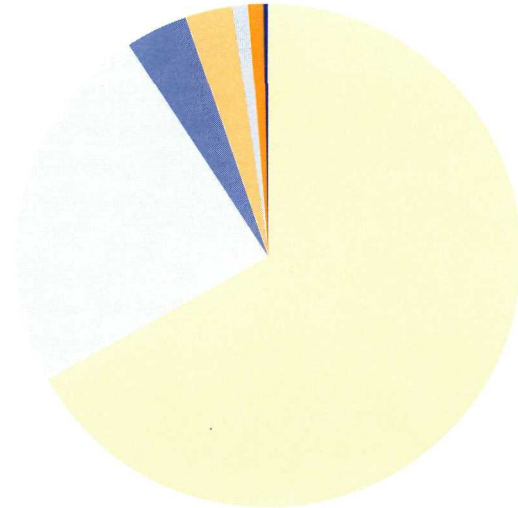
sources of operating resources



- State Appropriated General Funds: 88%
- Private Grants & Contracts: 5%
- Locally Generated, State Appropriated "IMSA Income Fund": 3%
- Locally Generated "IMSA Local Fund": 2%
- Governmental Grants & Contracts: 2%

Total Operating Resources: \$16,310,300

expenditures



- Personal Services: 67%
- Contractual Services: 24%
(includes health care services, food services, utilities, etc.)
- Equipment and Permanent Improvements: 4%
- Commodities: 3%
- Telecommunication Services: 1%
- Travel: 1%
- Other Expenses: 0.3%

To support and expand the Academy's research, innovative teaching and external service programs/initiatives, the Illinois General Assembly appropriated an operating budget of \$14.3 million in 1999–00. The IMSA Fund for Advancement of Education works to secure the support and participation of various constituencies including individuals, corporations, foundations, educational institutions and governmental agencies to advance the Academy's mission. During 1999–00, the IMSA Fund raised \$2.9 million in external support.

The most significant capital projects included replacement of the carpeting in the academic building, construction of a new storage and concession building (with public rest rooms) adjacent to the outdoor athletic facilities, re-paving of the employee and guest parking lots and replacement of the indoor pool lighting.

IMSA parents paid a \$940 fee in 1999–00 to offset some of the costs of cocurricular programs and residential services.

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The mission of the Illinois Mathematics and Science Academy, a pioneering educational community, is to transform mathematics and science teaching and learning by developing ethical leaders who know the joy of discovering and forging connections within and among mathematics, science, the arts, and the humanities by means of an exemplary laboratory environment characterized by research, innovative teaching, and service.

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