By 2022, IMSA aims to be a Recognized Global Leader and Catalyst in Equity and Excellence in STEM Teaching and Learning, Innovation and Entrepreneurship.

José M. Torres, PhD
President & CEO
LEGISLATIVE MANDATE 1
The primary role of the Academy shall be to offer a challenging education for students talented in the areas of mathematics and science.

LEGISLATIVE MANDATE 2
The Academy shall also carry a responsibility to stimulate further excellence for all Illinois schools in mathematics and science.
IMSA: We Believe That...

- All people have choices and are responsible for their actions.
- Belonging to a community requires commitment to the common good.
- Diverse perspectives enrich understanding and inspire discovery and creativity.
- Meaning is constructed by the learner.
- No one’s path in life is predetermined.
- The ability to discern and create connections is the essence of understanding.
- We are all stewards of our planet.
- We can significantly improve life on our planet.
IMSA’s Identity-Learning Laboratory

✓ Mentorship Program (SIR)
✓ Center for Problem Based Learning (PBL)
✓ Physics Gender-Based Classrooms
✓ Integrated Science
✓ United Nations 17 Sustainable Development Goals
IMSA’s Worldwide Impact:

Digital Commons
https://digitalcommons.imsa.edu

CRISPR knockout of the DUB OTUD6B in lung cancer cells

Miriam Franks '19, Nayonika Roy '19, and Suhitha Irukulla '19 present their research, conducted through Loyola Medical Center with Advisor, Dr. Maurizio Bocchetta, at IMSAloquium 2019.

View More

Browse Research, Scholarship and Creative Work

DigitalCommons@IMSA reflects the scholarly, innovative, and pedagogical culture of the Illinois Mathematics and Science Academy. The goal of this online repository is to share the intellectual output of IMSA and to increase visibility and impact through worldwide access.

This full-text, multimedia database links to open-access articles, conference proceedings, teacher resources, image and audio files, as well as provides references to books and other creative works not fully accessible online.

DigitalCommons@IMSA furthers IMSA's mission "to ignite and nurture creative, ethical scientific minds that advance the human condition, through a system distinguished by profound questions, collaborative relationships, personalized experiential learning, global networking, generative use of technology and pioneering outreach."
Illinois Mathematics and Science Academy:
Reunión Nacional de Profesores PrepaTec 2020

José M. Torres, Illinois Math and Science Academy

Document Type
Invited Speaker Presentation

Publication Date
7-6-2020
A Recognized Global Leader and Innovator

Ranked the #1 Public High School in the United States in by Niche.com – a ranking considered to be similar to the *U.S. News and World Report* college rankings

Dubbed the “Hogwarts for Hackers” by *WIRED* magazine

Hosted the 14th Annual ISSF in 2018, the first time the event was held in the United States.

Ranked among the top high school programs in the nation for placing graduates in Ivy League and other highly selective universities by:

- The Wall Street Journal
- Newsweek
- Worth

Featured for its groundbreaking work by global media outlets, including:

- CNN
- Dateline
- The New York Times
- Newsweek
- Education Week

IMSIA
imsa.edu
• 66% of IMSA alumni reside in Illinois
• 62% of alumni work in a STEM field
• 644 patents are held by alumni
• 24 alumni are presidents and CEOs of Illinois companies
• $101,000-$150,000 is the median income of IMSA Alumni, which is 2-3 times that of state and national averages
• 1,777 articles published by IMSA alumni
• 97% of IMSA alumni donate their time or money
• 13% of IMSA alumni have earned a PhD, this rate is eight times the national average

* Survey of 1,651 alumni, Impact Report 2017
Building Illinois’ STEM Pipeline

IMPACT

• Over the past five years, IMSA’s residential high school has served students who are advanced in mathematics and science from 67 counties across Illinois.

• 70% of PROMISE participants – focused on underrepresented populations – were accepted and enrolled at IMSA.

• Over 8,775 students and 7,064 educator participants; 68% of partner schools are low-income.
IMSA’s Micro Certification program is structured in four Micro Credentials representing IMSA’s **four core competencies** designed around those attributes or skills we believe should be the foundation of all learning experiences.

IMSA’s Micro Certification experience allows for **in-person training as well as on-line courses**. Through the program, participating teachers will learn how to incorporate the four core competencies that drive all IMSA curriculum and instructional practices into their curriculum and classrooms.
Core Competencies

- **Competency-driven** - enable students (1) to **acquire** strong disciplinary content knowledge and skills, (2) to **use** the ideas, processes, and tools of the disciplines for acquisition and generation of new knowledge; and (3) to **apply** knowledge.

- **Inquiry-based** - learning experiences are those which **promote** analytic thinking, knowledge generation and application, and construction of **meaning** through mindful investigation driven by **compelling questions** that have engaged, or have the potential for engaging, the learner’s **curiosity**.

- **Problem centered** - learning experiences are those in which learners **grapple with complex**, meaningful and **open-ended problems**, and work toward their **resolution**.

- **Integrative** - learning experiences are those which forge **meaningful connections** of concepts, constructs, and principles **within and across** academic subjects and **real-world situations**.
IMSA Facts

• 3 year, public, tuition free for IL residents, residential academy
• Serve 652 Illinois students, grade 10-12, talented in math and science
• Located 35 miles west of Chicago
• 7,817 alumni with 99% having enrolled in college
What is Learning like at IMSA?

• Learner / student centered
• Collaboration is expected
• Focus on reading, writing and critical thinking
• Speaking with clarity and conviction
• Inquiry-based approach
Inquiry-based Approach

- Explore academic content by posing, investigating and answering questions
- Questions are the center of the curriculum
- Focuses on the skills of research, knowledge acquisition and understanding content
- Students are given opportunities to take ownership of their own learning
- Allows student to draw connections between academic content and their own lives

Center for Inspired Teaching (2008)
Engineering Challenge

**Project:** Design a cardboard boat to support a team member inside the boat for a race across the school pool

**Constraints:** Time, cardboard, and duct tape

**Assessment:** Submit a written reflection of their design when event is completed; Reflection must demonstrate how students applied their knowledge of mathematics and physics to explain the success and failures of their particular design
## Academic (MOD) Schedules: ABICD

<table>
<thead>
<tr>
<th>Single (55 Mins)</th>
<th>Start</th>
<th>End</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8:00 am</td>
<td>8:55 am</td>
</tr>
<tr>
<td>2</td>
<td>9:00 am</td>
<td>9:55 am</td>
</tr>
<tr>
<td>3</td>
<td>10:00 am</td>
<td>10:55 am</td>
</tr>
<tr>
<td>4</td>
<td>11:00 am</td>
<td>11:55 am</td>
</tr>
<tr>
<td>MIDDAY</td>
<td>11:55 am – 12:20 pm</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Double (100 Mins)</th>
<th>Start</th>
<th>End</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 &amp; 2</td>
<td>8:10 am</td>
<td>9:50 am</td>
</tr>
<tr>
<td>3 &amp; 4</td>
<td>10:00 am</td>
<td>11:40 am</td>
</tr>
<tr>
<td>MIDDAY</td>
<td>11:40 am – 12:30 pm</td>
<td></td>
</tr>
<tr>
<td>5 &amp; 6</td>
<td>12:30 pm</td>
<td>2:10 pm</td>
</tr>
<tr>
<td>7 &amp; 8</td>
<td>2:20 pm</td>
<td>4:00 pm</td>
</tr>
</tbody>
</table>

I-Days for SIR
Student Inquiry and Research (SIR) supports 240 IMSA students representing half of all eligible juniors and seniors, and their investigation experiences both on and off-campus. SIR provides a framework for students to conduct original investigations on compelling questions of interest, collaborate with other students and professional researchers, and to share their investigation results through public presentations and publications.

Of the 240 IMSA students involved in SIR, 100 of them will be conducting research on campus this fall alongside IMSA faculty. The onsite research portion of the program accommodates students who participate in support programs available on days when off-site research programs are conducted.

PROGRAM HIGHLIGHTS
• 240 students involved in research
• 115 Students conducting on-site researching on campus alongside faculty and staff
• 125 students transported off-site to research partners, including Northwestern, University of Chicago, Rush University Hospital, FermiLab and Argonne.
IMSAlouquium

2020
• Investigation of Bacterial Carbonic Anhydrase S., Yatri S.
• Molecular Modelling and Synthesis of PDE4 Inhibitors, Ishani T.
• Pathogenic Resistance in Soil Microbes for Drug Design, Saachi D. and Neha M.

2019
• Creating a Particle Physics Simulation using AI, Aryan V.
• Developing a Multivariable Artificial Pancreas for Various Exercise Types and Intensities, Bala R.
• Improving Cardiovascular Disease Care among Liver Transplant Recipients, Aneesh M.

2018
• Brunnian Links and Tricolorability, Devika P. and Claudia Z.
• Cell-Specific Pallidal Control of Cortical Striatal I., Shubha V.
• Creating a Bio-Compatible Device for Intravital Culture of Skin Stem Cells and Tissue Regeneration, Faris S. and Katie S.

2017
• A Computational Graph-Theory Approach to Analyzing the Spread of Epidemics, Krishi K. and Sushil U.
• An Improved Initialization Approach to the K-Means Clustering Algorithm, Esther M.
• Early-State Diagnosis of Alzheimer’s Disease with the Use of Magnetic Nanostructures, Abhay G.
Global Talent Mentoring


- *Global Talent Mentoring* connects outstanding STEMM students as *mentees* with renowned STEMM experts as *mentors*.
  - One-on-one
  - Small Groups
  - Networking
Criteria for mentees

Students enter Global Talent Mentoring around the age of 16 years (in secondary or tertiary education) where they are connected with STEMM experts from all over the world. Exceptionally talented and exceptionally driven, mentees are the very best students in their STEMM area of choice, with many ranking at top of their national percentile. Students are typically nominated by our partners, which include talent development organizations, schools, and other types of organizations. Once nominated, prospective mentees complete our detailed application process. From this pool, Global Talent Mentoring selects the brightest and most motivated applicants to participate as mentees.

Prospective mentees should meet these criteria:

**Age:**

Mentees should be about 16 years old and enrolled in secondary or tertiary education at the start of mentoring (i.e., in December of the year in question). Students must be developmentally mature enough to work on projects with renowned experts.

**Excellent achievements in a STEMM field:**

Mentees need to demonstrate their STEMM excellence by presenting their STEMM achievements, such as performing well in international competitions or receiving awards or other verifiable forms of recognition of their excellence in a specific STEMM domain.
Mentor Profile

Distinctive STEMM expertise:

Mentors are leading experts in their respective STEMM field. They have demonstrated this expertise firstly through formal education, typically having earned a graduate-level tertiary degree (e.g., a PhD). Secondly, mentors are active researchers or developers in their respective STEMM disciplines (e.g., in a university research or corporate R&D capacity), as evidenced through, for example, international publications, patents, or outstanding professional accomplishments in a STEMM field.
North America

- Caribbean Centre for Giftedness and Creativity (Jamaica)
- College of William & Mary, Center for Gifted Education (United States)
- Florida Atlantic University (United States)
- Illinois Mathematics and Science Academy (United States)
- PASCO Scientific (United States)
- Triplebar Bio (United States)

Oceania

- Gifted Consulting (New Zealand)
- University of Wollongong (Australia)

South America

- Future Minds (Peru)
The Student Life staff at IMSA believes that it is a student’s responsibility, during the student’s three years at the Academy, to reach the student’s full potential in all areas of development with a special emphasis in leadership.

The staff provides appropriate interventions, support mechanisms, services and learning opportunities to help students reach their potential and to be healthy, ethical, productive members of the local and global communities. It is the staff’s accountability to facilitate the development, implementation, and assessment of these programs and to serve as student and parent advocate within the Academy.

**PROGRAM HIGHLIGHTS**
- Campus Activities
- Service Learning
- Leadership Education and Development
- Athletics
Stress and Relaxation
Titan Robotics Regional Champions
Titan Robotics Regional Champions
Chicago Regional Champions
Student Qualifications

• History of strong academic achievement
• Demonstrated passion for math, science and/or technology
• Interest in pursuing advanced study in STEM
• Self-motivated learner
• Maturity and readiness for residential experience
Application Requirements

• Online Application: Essays, Activity List and Parent Statement
• Teacher Evaluations: Math, Science, English, Optional
• Counselor Form with Transcripts & Grades: 2.5 years (GPA)
• SAT Test: Math, Evidence-Based Reading and Writing (essay not required)

Application Deadline: February
(March SAT test will be accepted.)
All faculty members hold a Masters degree and 56% have a PhD.

Many are prolific writers, from academic peer-reviewed pieces, to published short stories, to novels, including a series. Their unique approach to integrated learning gives students an academic experience like no other.

• **English** – Literary Explorations I-II, Gender Studies, Rhetoric and Communication, Science; Creative Writing Workshop, Graphic Novels, Modern Theater, Modern, World Fiction, etc.

• **Fine Arts** – Chamber Choir, Chamber Strings, String Orchestra, Observational Drawing, Scientific Illustration, 3D Design Foundations, etc.

• **History/Social Science** – American Studies, Ancient World Religion and Philosophy, Conflict in World History, History of Technology, Modern Economics, Modern Genocide and Mass Violence, etc.


• **Science** – Advanced Biological Systems, MSI, Advanced Chemistry, Biochemistry, Biophysics, Cancer Biology; Engineering, Microbes and Disease, Modern Physics, Organic Chemistry, etc.

• **Wellness** – Moving and Learning, Stress Management for Life, Dance, etc.

• **World Languages** – Spanish, French, German, Russian, Mandarin
Top 10 Institutions with Most IMSA Alumni All-Time

1. University of Illinois at Urbana
2. University of Illinois at Chicago
3. Northwestern University
4. University of Chicago
5. Massachusetts Institute of Technology
6. Washington University
7. Stanford University
8. Harvard University
9. Case Western Reserve University
10. Illinois Institute of Technology

181 Different Institutions
IMSA has been named the #1 Public High School in Illinois and # 2 in the U.S. in Niche.com’s 2020 rankings.

Niche’s annual K-12 rankings combine rigorous analysis of data from the U.S. Department of Education for factors like academics, teachers, culture and diversity and more with millions of reviews from students and parents about their local schools.
Amazing IMSA Alumni

Dr. Princess Imoukhuede '98
Associate Professor at Washington University in St. Louis

Arati Shroff '98
U.S. Diplomat

Steve Chen '96
American Internet Entrepreneur
Co-founder of YouTube, Co-founder of AVOS

Sabrina Gonzalez Pasterski '10
Ph.D. candidate in physics at Harvard’s Center for the Fundamental Laws of Nature

Dr. Aaron Parness ‘00
Group Leader, Extreme Environment Robots at NASA

Dr. Lynn Sosa ‘94
Connecticut Deputy State Epidemiologist
Enrolling in Our Possibility

If we do what we know and feel is right, it is bound to happen that among our graduates there will be numbered scientists, engineers, and those who go on to earn degrees in law and letters. There are likely to be those few who create new intellectual worlds, cure a dreaded human ailment or in some other way significantly influence life on our planet. Our philosophy will be to treat our charges as if each one is capable of this extraordinary achievement. Only one such product will make the effort and expense of this school for its entire duration worthwhile.
Soon to be Published...

Teaching with the World in Mind

José M. Torres, PhD
Takeaways and ideas for PrepaTec
...adapt, not adopt!

Considerations:
• Conceptual Development
• Creative & Scientific Thinking
• Ethical Leadership
• Student Inquiry & Research
• United Nations 17 Sustainable Development Goals

Next Steps:
• Micro-Credential
• Global Talent Mentoring
• Cooperate in Research
• ?
Preguntas y Comentarios
Esperamos continuar creando enlaces con PrepaTec

Expanding IMSA’s reach throughout the world.