



MSEF

Massachusetts Science
+ Engineering Fair

2026 IMPACT REPORT

Background

- Celiac is an autoimmune disease where the immune system attacks itself after the consumption of gluten, a protein found in wheat, barley, and rye.
- Celiac is a chronic illness with the only treatment being a gluten free diet. (Fasano & Catassi, 2012)
- 30-60% of celiac patients have persistent symptoms despite treatment. (FitzPatrick et al., 2025)
- Around 1% of the global population has celiac, despite being highly underdiagnosed. (Fasano & Catassi, 2012)

Immune Scarring

- Refers to persistent changes in immune signaling that remains after gluten exposure.
- A 2025 Nature Immunology suggests that acute intestinal inflammation can leave long-term alterations in immune gene expression. (FitzPatrick et al., 2025)

Defining Questions

- Can early inflammatory exposure in *C. elegans* create long term immune dysfunction similar to the persistent symptoms seen in treated celiac patients, and if so, can this model be used for further research and drug development?

Hypotheses

- *C. elegans* exposed to higher, but not toxic concentrations of pathogens (PA14) for 2 weeks will show more severe persistent immune dysfunction, including increased gut permeability and elevated inflammatory activity, like symptoms experienced by celiac patients.

C. elegans

- 1mm long nematodes widely used in biological research.
- Advantages:
 - Transparent body allows for easy observation of internal organs and proteins (Brenner, 1974)
 - Fully mapped out genome
 - Rapid life cycle (*C. elegans* reaches adulthood in 3 days)

A Note From Our Executive Director

Every student deserves the opportunity to ask questions, solve problems, and pursue ideas that matter to them. Participating in an independent, student-led science & engineering fair project is this opportunity.

The stories and data in this report reflect not only the impact on young people, but also the collective commitment of the educators, volunteers, judges, universities, industry partners, foundations, and individual donors who make this work possible.

Together, we are expanding access to high-quality STEM learning and helping more young people discover what they are capable of.

Thank you for believing in the potential of every student and for making this work possible.

-Helen Rosenfeld, MSEF Executive Director





Authentic Inquiry in Action

“ True inquiry is the gold standard in science education, and science fair projects are the closest we get to true inquiry.

District STEM Leader, Westfield

Growing Opportunity Across Massachusetts

During the 2025–26 academic year, MSEF supported more schools, educators, and students than ever before, expanding access to authentic STEM learning across Massachusetts. This growing statewide network included students from 25 of the Commonwealth's 26 Gateway Cities, with 70% of participating schools being public schools.

Reach

229 schools

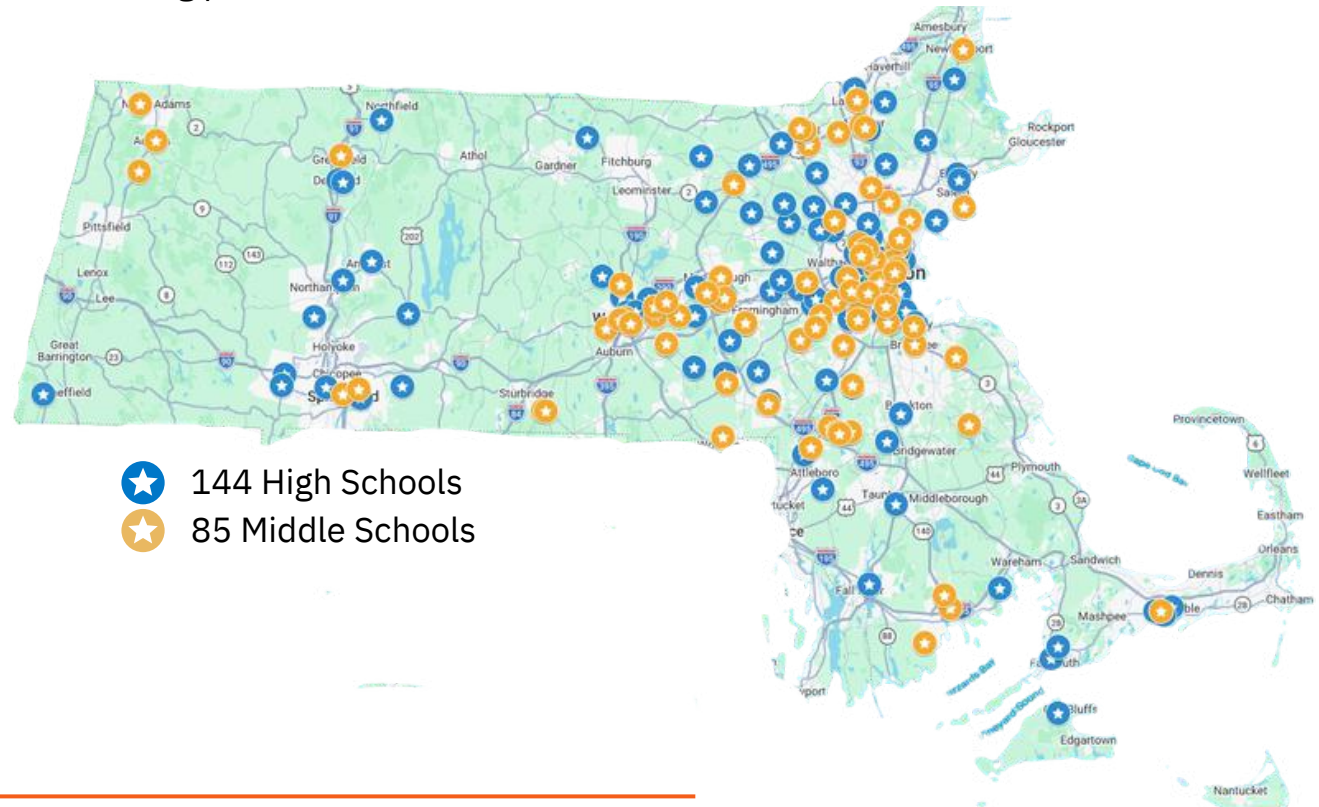
15% year-over-year growth in school participation

373 teachers

Strengthening schools' ability to deliver authentic STEM learning experiences

6,400+ students

Participating in inquiry-based STEM learning across Massachusetts



Science Fair Pathway

1,382 Regional Fair Participants

Presented research at a 2026 Regional Fair

12 Regional Fairs

Volunteer-led events supported by MSEF statewide

725 State Fair Participants

*426 High School Students on April 9 at the DCU Center
299 Middle School Students on May 9 at Clark University*



Helping Teachers Succeed

“ Navigating science fair was tricky at first but once I realized how many supportive materials there were I felt supported and clear.

High School teacher, Boxford

Investing in Teachers, Expanding Student Opportunity

Helping students conduct authentic scientific research transforms learning—but it also asks a great deal of educators. Thanks to donor support, teachers across Massachusetts accessed no-cost training, resources, technical assistance, and professional connections through MSEF's Getting Science Fair Ready program, helping bring authentic STEM learning to more students than ever before.

We do this through individualized support, professional learning & workshops, building community and making connections.

Science Fair Ready Teacher Toolkit

Launched in 2025–26, the Science Fair Ready Teacher Toolkit expanded MSEF's year-round support for educators.

Co-created with 12 teachers, the Toolkit reflects the practical needs and experiences of educators implementing science fair in their classrooms.

The Toolkit provides classroom-ready resources, planning guides, and implementation tools designed to help teachers bring authentic research experiences into their classrooms with confidence.



Networks of Support

This year a Boston teacher was supporting two students interested in exploring transportation challenges they encountered on their daily commute.

MSEF leveraged its network of science fair volunteers to connect the teacher and her students with an MBTA engineer, providing access to real-world data, professional expertise, and industry perspective that helped bring their project to life.

Supporting Educators, Strengthening Classrooms

Because of MSEF's year-round support, educators across Massachusetts gained the confidence, resources, and connections to guide independent student research.

Teachers reported feeling better prepared to foster curiosity, support inquiry, and create more meaningful STEM learning experiences for thousands of students across Massachusetts.

A participating science teacher in Boston reflected:

“ I was hesitant about teaching science fair. It felt daunting...”

But once I started engaging with MSEF, I realized there is a huge community and so much support to make this accessible for teachers and students.

It transformed the way that I teach science fair and made it incredibly meaningful to me and my students.



76%

of educators reported that MSEF strengthened their confidence to facilitate independent student research.

Learning Through Discovery

“ Being able to spit out a bunch of random facts about water filtration, which was my project, makes me feel really smart and good about myself.

Middle School student,
Hadley

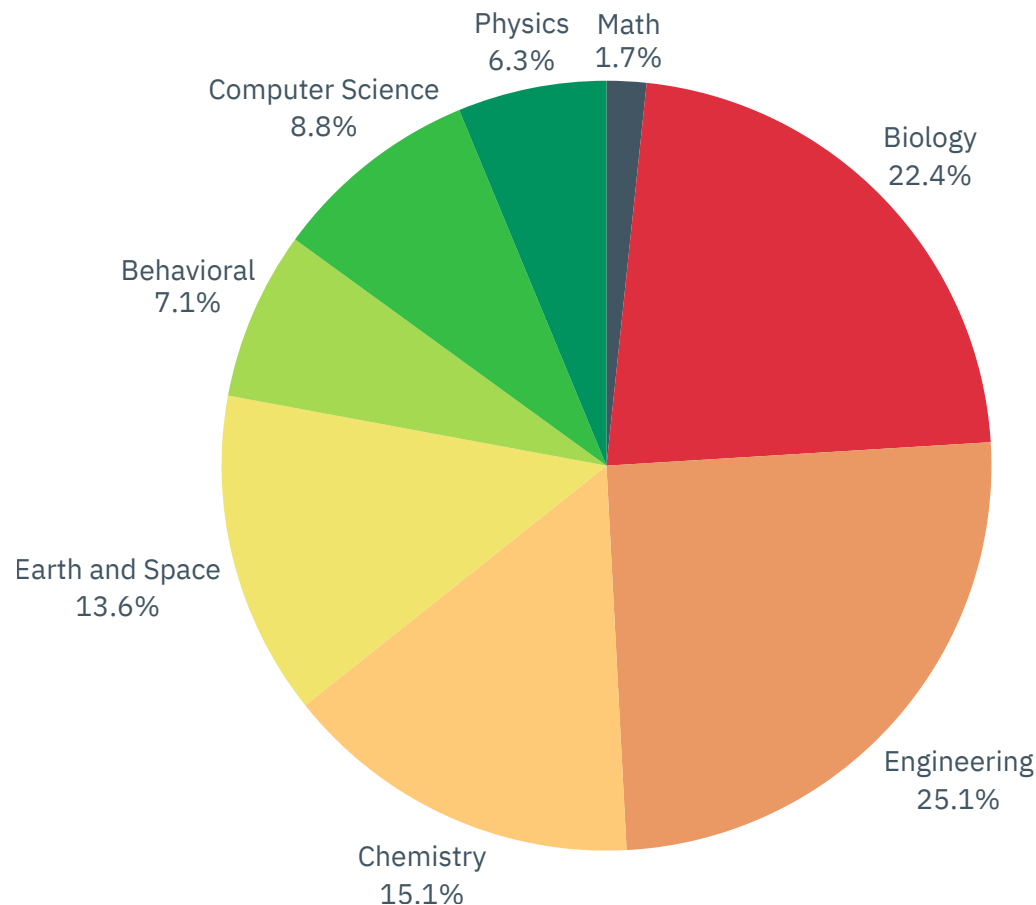


What Students Are Investigating

Science fair gives students the opportunity to pursue questions that matter to them. Students learn what scientists and engineers do and experience what it feels like to think, question, experiment, and discover for themselves.

In 2026, State Fair projects spanned a wide range of STEM disciplines, reflecting the diversity of topics students chose to investigate.

2026 State Fair Projects by Category



Across these disciplines, students investigated a wide variety of scientific questions and research topics.

80% of State Fair projects are concentrated in 3 broad areas of interest, suggesting students are motivated to address relevant, real-world challenges and explore new technologies.

37% solving environmental challenges like water, pollution, & sustainability

22% improving human health - especially cancer and neurological disorders

19% exploring engineering and research solutions through artificial intelligence and data science

Preparing Students for Success

Students received support throughout every stage of their research journey—from exploring project ideas and developing research plans to presenting their research and receiving expert feedback.

Student & Guardian Information Sessions

40 participants • 61 views

Helping students and families understand the science fair process, timelines, and opportunities available through MSEF.

Presentation Coaching

30 students coached by 25 STEM volunteers

Practice sessions designed to help students build confidence communicating their research and preparing for interactions with judges.

Intro To: Webinar Series

6 webinars • 80 participants • 402 views

Virtual workshops introducing students to different fields of STEM research, including topics such as chemical engineering, helping students explore project ideas and possibilities.

Computational Tools & Training

21 students received free MATLAB licenses

Students received free MATLAB licenses and virtual training through MSEF's partnership with MathWorks, helping them incorporate computational tools into their research projects.



Research Review & Guidance

39 volunteer reviewers provided scientific review for 2,101 student research projects

Through MSEF's Scientific Review Committee (SRC), students receive feedback on research plans before projects begin. Modeled after professional scientific review, SRC volunteers help students strengthen project design, address ethical and safety considerations, and ensure projects meet established scientific standards.

Building Skills for Life

Science fair transforms students from consumers of information into leaders of their own learning.

Through independent research and engineering design, students build scientific understanding, confidence, and durable skills needed to navigate complex challenges both in and beyond the classroom.

“ I didn't think I had the patience to work through the process, but through working in small steps I completed a project.

Middle School student, Shrewsbury

Student Growth in 2025–26

98%

STEM Skills & Understanding

Almost all students reported an increased understanding of how STEM research and careers work in the real world.

88%

Durable Skills

Most teachers observed growth in students' durable skills like collaboration and communication.

79%

Executive Functioning

Teachers observed growth in students' executive functioning skills and college and career readiness.



Finding a Community

For some students science fair changes more than their understanding of science—it changes how they experience school.

One participating teacher on Cape Cod described previously disengaged students becoming deeply invested in their research.

“They moved their seats to be closer to the rest of the class and participate more often.”

They spent extra time experimenting, proudly shared their work with friends, and eagerly talked with STEM professionals. Their excitement extended beyond the classroom. As she put it, “their whole families heard about it.”

93%

STEM Confidence

Student confidence in conducting independent research grew from 32% at the start of the year to 93% by the end of their project

~70%

School Engagement

Teachers observed deeper student engagement in school overall.



Finding a Future

Science fair helps students imagine futures they may never have considered. Through authentic research, they begin to see themselves as scientists, engineers, researchers, and innovators.

97%

STEM Interest

Almost all students reported an increased interest in STEM careers

88%

Belonging in STEM

Teachers reported seeing increased student belonging in STEM and school communities

A Future Reimagined

One teacher recently reflected on a former student whose science fair project reshaped her plans for the future.

She entered high school planning to major in painting. Through her science fair project, she discovered a passion for chemistry.

This fall, she begins college pursuing chemistry while continuing her artistic interests through an art minor.

Stories like this illustrate how authentic research helps students discover new interests, imagine new possibilities, and begin to see themselves in STEM fields.





Independent validation of student growth

“*I was absolutely blown away by the preparation, design of experiment, results, and presentations.*”

MSEF Judge, Harvard University

2025-26 Judge Community

Student research projects span a wide range of scientific and engineering disciplines, often drawing on concepts and methods from multiple fields.

To ensure students receive meaningful feedback, MSEF recruits a diverse cohort of STEM professionals from across industry, academia, government, healthcare, and nonprofit organizations whose expertise reflects the breadth of research taking place across Massachusetts.

In 2025-26, more STEM professionals participated in MSEF judging than ever before, creating a statewide community of support for student researchers.

1,200+ STEM professionals served as judges statewide

75% returning judges

100% would recommend judging to a colleague

98% described the experience as very or extremely gratifying



Preparing Judges to Support Student Learning

For many students, science fair is their first opportunity to discuss their work with scientists, engineers, and other STEM professionals.

These conversations challenge students to think more deeply about their research, strengthen their communication skills, and help them see themselves as part of a broader STEM community.

Preparing Judges

In 2025–26, MSEF redesigned judge training to better help STEM professionals create meaningful experiences for students. New student videos highlighted the lasting impact thoughtful judging can have on confidence, learning, and belonging.

Live and on-demand training made participation more accessible for volunteers across Massachusetts.

“ I think this was one of the best prepped sets of judges.
High School Teacher, Barnstable

Turning Judging into Learning

Judging interactions were designed to extend learning beyond the classroom. Judges were encouraged to ask thoughtful questions, recognize strengths, and engage students in conversations that challenged them to think more deeply about their research.

Written Feedback

This year, MSEF emphasized the importance of thoughtful written comments so students could continue learning long after the fair.

Since students do not receive final judging scores, written feedback provides meaningful guidance they can reflect on to refine ideas and inspire future research. Educators reported that students returned to these comments after the fair, extending learning beyond competition.

96% Submitted Comments
compared to 70% in 2025

5,023 Judging Sessions
at Regional and State Fairs

Statewide Pathway for Student Research

MSEF's fair pathway provides students with opportunities to share their work, receive meaningful feedback, build confidence, and connect with a broader STEM community as their research develops.

Students first present their projects at school fairs and local events before advancing to one of 12 Regional Fairs held across six regions of Massachusetts. For many students, Regional Fairs are their first opportunity to present alongside peers from other schools and receive feedback that helps strengthen their research.

“ I was able to build on the advice of my regional judges to approach my data in new ways for the state fair.”
High School Student, Falmouth

Top projects advance to the Massachusetts Middle School and High School State Fairs. Whether a student's journey ends at a school fair or continues to the international stage, each experience builds confidence, deepens learning, and creates lasting connections to STEM.

2025–26 Fair Participation

1,382	Students Presented research at Regional Fairs
426	High School Students at the High School State Fair
299	Middle School Students at the Middle School State Fair



Creating Future Opportunities

MSEF connects student achievement to opportunities beyond the fair through scholarships, summer programs, and continued STEM experiences.

Building on its partnership with MSEF as a State Fair host and award supporter, Clark University expanded its commitment this year with a new opportunity for student researchers. This year eligible students earning third place or higher at the High School State Fair now have access to guaranteed admission and a \$32,000/year merit scholarship opportunity, opening doors beyond the fair.

Celebrating Achievement in 2025-2026

The Massachusetts Middle School and High School State Fairs represent the culmination of months of student research, perseverance, and discovery. Through awards, scholarships, and educational opportunities, MSEF celebrates outstanding scientific achievement while opening doors to future opportunities.

Recognizing Excellence

Placement Awards celebrate top-scoring scientific research and engineering design across a wide range of STEM disciplines.

Supported by Alnylam, AMD, Cabot Corporation, MathWorks, MCTA and Sanofi Pharmaceuticals

Celebrating Innovation & Impact

Special Awards highlight projects that apply STEM thinking to real-world challenges and emerging areas of research.

Supported by Broadcom Coding with Commitment®, Eversource Energy and The Massachusetts Life Sciences Center

Honoring Growth & Perseverance

Teacher-nominated awards celebrate students who demonstrate determination, curiosity, resilience, and personal growth throughout the science fair journey.

Supported by SharkNinja, Fish & Richardson and Clark University

\$569,750 Earned by students through scholarships and prize awards during the 2025-26 State Fairs.



Massachusetts on the Global Stage

Each year, MSEF provides Massachusetts' top student researchers the opportunity to compete at the Regeneron International Science and Engineering Fair (ISEF), the world's largest pre-college STEM competition.

ISEF represents the highest level of the science fair journey — where students share their research, connect with peers from around the world, and see themselves as part of a global STEM community.

This year's delegation represented public, vocational, independent, and virtual schools from across Massachusetts—demonstrating that exceptional research can emerge from every type of learning environment.

No student should miss this opportunity because of cost. MSEF removes barriers by covering registration, travel, lodging, and meals for every student selected to represent Massachusetts at ISEF.

Massachusetts Students Excelled on the World Stage

Massachusetts students earned top honors across multiple scientific disciplines and received recognition from leading academic and professional organizations.

2026 ISEF Awards

- 2 First Place Awards
- 3 Second Place Awards
- 1 Third Place Award
- 4 Special Awards & Scholarships

2026 MA ISEF Delegation

16 Students

15 Projects

13 Schools

Representing all six regions of Massachusetts



Finding Joy and Hope

Many educators described the experience of supporting student research as deeply rewarding.

“I don't think I've enjoyed teaching as much as when I work with kids for the science fair.”

High School teacher, Springfield

Students often described the pride and confidence that came from pursuing their own questions and contributing new knowledge.

“I got to do real science, and felt like I was truly developing and maturing as a scientist.”

High School student, Boston

Judges often reflected on the optimism they felt after interacting with the next generation.

“Being a judge brings me a profound sense of optimism for our future.”

MSEF Judge, Amazon

These reflections remind us that science fair is about far more than competition. It helps young people discover what they are capable of, supports educators who make that growth possible, and connects students with a community that believes in their potential.

Together, those experiences create something powerful: confidence, belonging, joy, and hope for the future.



Looking Forward

As participation continues to grow, MSEF will continue investing in the teachers, students, judges, and partners who make authentic research possible.

Together, we are building a stronger STEM community where every student has the opportunity to ask questions, make discoveries, and imagine a future in science and engineering.

LET'S CONNECT!

Help us increase our impact.

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