

# Minnesota Academy of Science Annual Report & Newsletter



**MINNESOTA  
ACADEMY  
OF SCIENCE**

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## Thank You, Volunteers!

By Celia Waldock, Executive Director



*Science Bowl volunteers pause for a photo between rounds* Photo by Dave Newell

Every year, the Minnesota Academy of Science relies on hundreds of volunteers to donate thousands of hours to not only make our programs successful, but to make them happen. In 2014, 738 volunteers donated 6,273 hours to Academy programs. We have a small budget and a small staff. So volunteers do everything from set-up to clean-up to

taking tickets to running question packets between floors at Science Bowl to reviewing scientific questions and papers to judging student projects.

### Why do you do it?

- Picture the rush of adrenalin students get when correctly answering the 5 second toss-up question during Science Bowl or the excitement of a Science Bowl team testing their knowledge against other students and winning a chance to go to Washington, D.C. to compete at Nationals.
- Picture the appreciation students feel when they get thorough feedback on their HS STEM Communicator Awards research paper and have an opportunity to publish it.
- Picture the eagerness on the face of a young person keen to tell real scientists what their research is all about during their oral paper presentations at JSHS.



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# Thank you, Volunteers! (Cont.)

- Picture the anticipation students feel who are anxious to demonstrate their hard work as you view their project board and give them feedback at the State Science & Engineering Fair.
- Our students overwhelmingly report that feedback and conversations with scientists are highly anticipated and incredibly helpful and that participating in our programs significantly enhances their interest in science and pursuing science in college and careers.
- Being able to share with you the work they've done, the learning they've achieved, the joy (or pain) they've experienced during the process and the discoveries they've made is the ultimate pay off for hundreds of students every year.

Your attention and time make all of it possible. You are giving them a gift that can motivate them to live their passion for a lifetime.



*First-year volunteers at Science Bowl raise their hands*

*Photo by Dave Newell*

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## Membership Information

Minnesota will need to fill 188,000 jobs in the fields of science, technology, engineering, and math (STEM) by 2018. The Minnesota Academy of Science works to foster interest in STEM fields by providing opportunities for students and adults to experience the excitement of scientific discovery.

Since 1873, our supporting members have made it possible for MAS to promote scientific exploration, education, and networking through programs for scientists of all ages. Our programs mobilize educators, science professionals, and businesses to provide opportunities for students and adults to showcase their scientific research and gain recognition for their remarkable contributions.

Become a member of the Minnesota Academy of Science and help us recognize, promote, and influence excellence in science at all levels. Join or renew at [www.mnmas.org/memberships](http://www.mnmas.org/memberships).

# Your Employer May Match Your Gift of Time With Dollars

By Mike Williams, President of the Board of Directors

In addition to pledging financial support to the Minnesota Academy of Science, I invest my time as a volunteer in support of the programs administered by the Academy. Whenever possible, I like to volunteer as a scorekeeper, scientific judge, or moderator at the Science Bowl competitions. I also enjoy volunteering as a judge at the Minnesota State Science & Engineering Fair and at the Winchell Undergraduate Research Symposium. It is incredible to see these young people demonstrate their ideas, their brilliance and their passion. Whether they are competing in the fast-paced environment of the Science Bowl or presenting their research in oral competition at Junior Science & Humanities Symposium or submitting their papers to the High School STEM Communicator Awards or presenting their projects at Science & Engineering Fair, it is an honor to meet them—our next generation of scientists. Simply put, it's FUN! Take Sarah Betts, for example, a 7th grader, (yes, 7th grader) who invented an orthopedic device, the ViEx, to relieve pain and improve hand function in osteoarthritis sufferers. Or high school students, Easton McChesney and Wolfgang Ofstedal who engineered a filter to remove phosphates from stormwater runoff to protect freshwater systems. The list of these hardworking students is endless.



*Dr. Williams volunteering at the 2015 High School Science Bowl*

*Photo by Dave Newell*

My employer helps make my support of the Minnesota Academy of Science even more significant. 3Mgives, which administers the philanthropic activity of the 3M Foundation, generously matches my volunteer hours with a \$250 donation to the Academy when I volunteer 20 hours or more in one fiscal year and apply for the volunteer match before February 28. Medtronic matches 25 hours per year or more with a matching gift of \$500. At Medtronic, you can apply after their fiscal year end of May 1. These are both easy ways to leverage your volunteer time in order to have a greater impact. Please consider tracking your hours and, when possible, bringing them up to the level necessary to qualify for a gift match at your company. You can contact the Minnesota Academy of Science program director with whom you work to find out how many volunteer hours you have worked and to learn about any other opportunities there are available to accumulate the hours you need to qualify for a match.

Please check with your employer, usually through the Human Resources Department, and, if your company matches volunteer hours or financial gifts, send an email to our Executive Director at [celiawaldock@gmail.com](mailto:celiawaldock@gmail.com) so we can add your company to our website list at <http://mnmas.org/double-your-gift>.

Your time and support now will surely bring a big payoff to the students you help to excite, motivate and encourage as they grow in their high school, college and career years.



## Board of Directors

The Minnesota Academy of Science Board of Directors is made up of representatives from K-12 education, colleges and universities, and industry professionals. They include science teachers and professors, professional scientists, and other adults who support science and science education. Board members are elected by the Board of Directors to serve a three-year term. Officers are elected by the voting membership.

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## Science Salon at Mayo Clinic Sports Medicine Center

By Anne Brataas, President of the Story Laboratory

I jumped at the chance to have a behind-the-scenes, after-hours tour of Mayo Clinic Sports Medicine Center because I knew it would be a rare opportunity to see this newly opened world-class training and treatment facility—and more importantly, to hear all about it from the medical directors of the new center. Boy, was I right! We saw premiere diagnostic and treatment equipment, as well as exercise physiology facilities that don't exist elsewhere in the region, including diagnostic musculoskeletal ultrasound, which we saw demonstrated; the strongest commercially-available MRI magnet, at 3 Tesla; and a manual sports enhancement treadmill I loved called the Woodward Curve. It's weirdly simple, fun to run on, burns 30% more calories and recruits more muscles than an ordinary treadmill.

The highlight for me was the excellent scientific sports medicine presentations by Dr. Nancy Cummings on non-surgical and surgical solutions the centers' medical experts and trainers offer, and by Dr. Jonathan Finnoff on regenerative medicine approaches to rehabilitation using Platelet Rich Plasma (PRP), as well as Mayo's leadership in researching the field. It's no wonder that Minnesota's professional sports teams are turning to Mayo Sports Medicine for care.

And how amazing that the Center is open to all other kinds of patients, too, from teenagers training for sports, to elders rehabbing from injury! My college-age son attended the Salon with me and was so impressed he made an appointment last week to have a back issue evaluated. Dr. Finnoff saw him within two days. During the consult, Dr. Finnoff noted that an MRI could confirm his diagnosis, but he was so confident that other exam results supported his conclusion he did not add that expensive test. Impressive cost containment, thank you! My son then met with a staff physical trainer—deemed him the best he'd ever met—and now has a safe and sane rehab routine for his lower back that he can use at any gym. We are all impressed by and pleased with the care, and thrilled this top-of-the-line health resource is in the Twin Cities.

# Science Salon at Mayo Clinic Sports Medicine Center

Photos by Dave Newell



Medical student Philip Thomas talks with Senators Ruud and Nelson and MAS Executive Director Celia Waldock

“ I was invited to attend the Science Salon by a former professor who knew of my interest in sports medicine as a soon-to-be medical student. I most enjoyed the tour of the new exquisite facilities and equipment! I have toured other sports medicine centers and none of them compare to the technology and perfection of the Mayo Clinic Sports Medicine Center. The rehab and exercise room was phenomenal; such a great resource for recovering athletes!

-Tiffany Sinclair, Recent Graduate



Dr. Finnoff demonstrates one of the resistance machines used for rehabilitation

“ I attended the event because it was directly related to my field and it provided me the opportunity to tour the impressive new Mayo Clinic facility. The guided tour by the keynote speakers was informative and truly demonstrated the passion that each has for their respective contributions to sports medicine. This event was very enjoyable, I look forward to attending more Science Salons in the future and learning about new areas of science and technology.

-Samuel Courtright, Exercise Specialist



Dr. Cummings led attendees for part of the tour of the Center



# Science Salon at Mayo Clinic Sports Medicine Center

Photos by Dave Newell



Senators Senjem, Nelson, and Ruud attended the talks and tour

“ It was a wonderful event. I learned a great deal. We are living in exciting times of scientific and medical advancement, and I’m thrilled that we are at its epicenter.

-Carla Nelson, State Senator

“ The highlight of the tour for me was to personally talk to one of the doctors and to learn that both NBA and WNBA teams will go there to get treated (as I am a big basketball fan and former player). I connected with new people I did not know and people I have heard of, as well as with one of the Mayo Clinic doctors.

-Irene Bueno, PhD Candidate



Richard Larsen, PT, OCS, Operations Manager at Mayo Clinic Sports Medicine Center, talks to attendees

“ I really love the Science Salon tours in general and hope MAS is able to sustain them! It is a great communal gathering and format for proliferating human capability. I attend these gatherings because I love to learn and it is a fairly passive, enjoyable way to do so. It is important to stay up to date on what is possible and, on the other side, to have a forum in which to share one’s hard work.

-Nathan Kot, Engineer



Lindy Bowen networks with Jerry and Nancy Kolb

# Dr. Deborah Swackhamer Gives a Talk on Water Quality Sustainability at Science Salon

By Eliza Grames, Communications Specialist

“Do we have enough water, and will it be clean enough?” This was the question that Dr. Deborah Swackhamer addressed in her talk at Science Salon on January 29, 2015. More than 50 people attended the event, which was held at the Humphrey School for Public Affairs at the University of Minnesota.

According to Dr. Swackhamer, “Water stress is evident, even here at home.” Even though Minnesota is the most water-rich state in the contiguous 48 states in terms of fresh water, it might not be enough because of population pressures. As more people move to the Twin Cities metro area, groundwater is being depleted at an unsustainable rate. “We need water, and want water, and use water where we don’t have it,” says Dr. Swackhamer.

Looking ahead, Minnesota needs to focus on both water quantity and water quality. Of all lakes and rivers in Minnesota, 40% are impaired, meaning that they don’t meet standards for water quality. To address this pressing problem, Dr. Swackhamer worked with a team of more than 250 water professionals to develop the Minnesota Water Sustainability Framework. “One of the first things we had to do was say, ‘What are the issues that the state is facing?’”

The main problems that the



*Dr. Swackhamer poses for a photo prior to her talk*

*Photo by Dave Newell*

team identified were excess nutrients and contaminants of emerging concern. Excess nutrients, namely phosphorus and nitrogen, lead to eutrophication of lakes and can have human health impacts. Water with more than 710 mg/L of nitrates can be fatal for infants, and water in many parts of the state exceeds this level. Similarly, contaminants of emerging concern, such as pharmaceuticals, contribute to problems with reproduction, growth, development, behavior, and next generation health problems.

The good news is that there are things Minnesota can do, and is already doing, to achieve water quality sustainability. Minnesota companies are working on green chemistry to create clean products that reduce contaminants in waterways. The Minnesota legislature has

invested money to create more observation wells across the state to monitor groundwater levels. Most importantly, according to Dr. Swackhamer, is that policymakers need to recognize that water is connected to land use and other policies.

“We’ve got to address water resources as an integrated, holistic system,” says Dr. Swackhamer. Minnesota is a leader in watershed district management, with 81 defined watersheds. “No other state is as far along as we are at managing our water from a watershed level,” according to Dr. Swackhamer. To conclude her talk, Dr. Swackhamer emphasized that “Each and every one of us has a responsibility to protect and restore our water resources.”



# Science Salon Featuring Dr. Deborah Swackhamer

Photos by Dave Newell



Lauren Sampedro talks with a former colleague from the Master Water Steward program

“ I was motivated to attend because water sustainability is an extremely important topic that needs to be addressed even in water rich Minnesota, and Dr. Swackhamer always does a fine job presenting water solutions.

I enjoyed that Dr. Swackhamer tried to keep a positive light on the topic, despite the many problems Minnesota needs to address in terms of preserving our resources. She emphasized that there are doable solutions, and that it's not all "doom and gloom".

*-Lauren Sampedro, Program Assistant*



Dr. Swackhamer opened up the floor to questions from the audience after her talk



# Science Salon Featuring Dr. Deborah Swackhamer

Photos by Dave Newell



Colin Brownlow from the University of St. Thomas speaks with Andy Polzin, Vice President of Barr Engineering



Attendees had ample time to network over refreshments before Dr. Swackhamer's talk

“ I was motivated to attend the Science Salon because Dr. Swackhamer is a world-class leader in her field, and the topic of her talk couldn't be more important, especially for Minnesotans. Building on details I learned during another lecture of hers at the UMN Institute on the Environment (along with John Linc Stine, Commissioner of the Minnesota Pollution Control Agency, and Bonnie Keeler, Director of the Natural Capital Project), I have become much more aware of Minnesota's water quality concerns. White Bear Lake and other media stories have highlighted our need for better regulation of water quantity, but water quality remains an issue because such a high percentage of our surface water is in peril. Unfortunately, many of these lakes and rivers are only marginally impaired, and therefore not to the extent that the public sees a need to remediate them. That is why conversations from Dr. Swackhamer and others are so necessary, so that we begin taking these issues more seriously.

*-Connor Klemenhagen, Undergraduate Student*



More than 50 people attended Science Salon to network with each other and hear from Dr. Swackhamer

# Highlights of volunteering at the Science Bowl

By Brooke Timp, Guild of Learners

Recently I served as a scientific judge at the Minnesota State Regional High School Science Bowl. Considering the rules of the competition, i.e. no visual aids, no calculators, no discussion between teammates, and questions expire after 5 seconds—including many that require complex calculation ( $15! = ?$ ), I was prepared to be amazed.

As double elimination progressed, the matches got more exciting—no questions were left unanswered and a very high percentage of answers were guessed correctly. As teams dropped out of competition, they filled out the audience.

By the time the championship match started we had a full house. The Blake 1 team came in from another bracket, and we had not yet seen them play, while Chanhassen 1 had already won several matches in our room. The energy was huge. Everyone kicked it up a gear, even though the questions were noticeably more difficult. The audience frequently wore expressions of awe and incredulity. Bonus question discussions were audible to the crowd, so the room got in on the teams' thought process.

My favorite moment of the match came during a bonus question for Blake 1, a Chemistry-Short Answer problem (for a bonus question, up to 20 seconds of team discussion is allowed, but only the team captain can report to the moderator). This was a stoichiometry problem involving a reactant of known molar mass but unknown molecular formula. They were all calculating frantically and didn't think they had enough time to complete the problem. As the timekeeper called out a 5 second warning the team captain appealed, "I need something now!" And the fastest solver called out (because, you see, he was calculating on the fly and yelling as he finished his operations):

"C2!"

"C2!" said the captain to the moderator.

"H4!"

"H4!"

"... (scribble, scribble)... (scribble)... O3!"

"O3!"

Correct and in time—just barely! The audience breathed a sigh of relief with them. This instant really highlighted the team's cohesion and complete trust in each other. Blake 1 ended up taking the match, and now they are on their way to the National Science Bowl in Washington, D.C. I cannot wait to find out how they do at the national competition. Congratulations and best of luck to the Blake School-Team 1! Keep up the good work Science Bowlers, and I'll see you again next year!



*Brooke Timp (center) poses with some of her fellow volunteers at Science Bowl*

*Photo by Dave Newell*



# Teamwork and Comradery at Science Bowl

By Nathan Steckman, Minnetonka High School

We are in our fourth year of competing in the Minnesota Academy of Science Regional Science Bowl and our third year as a team. Our team is comprised mostly of juniors, but our captain is a senior. We are fairly strong all around and our strengths play to each other's weaknesses. In our eighth grade year, our science teachers approached us, explained what Science Bowl is, and then asked us to join. As a group we decided to join because we all are very interested in science.

We have stuck with Science Bowl because we enjoy competition and enjoy work with our friends. In order to prepare for the Science Bowl my team and I would meet once a week and read questions from past science bowls in competition format. This year, for the first time, we designed t-shirts that were a big hit.

In our experiences at the Science Bowl we have grown closer together and learned how each of our teammates thinks and how we work best together. In our many competitions and conversations with the amazing volunteers we learned a lot of useful information.

We attribute our repeated winning of the civility award to our enjoyment of the competition and the comradery of our team. We let this spirit of comradery spill out into our interactions with participants and coaches from other schools as well as to the volunteers that staff the Science Bowl.



*Nathan Steckman (second from right) and his teammates pose with Dr. Michael Williams*

*Photo by Eliza Grames*

# Supporting STEM activities through volunteering

By Jennifer Brulc, General Mills

I feel incredibly passionate about supporting STEM activities and I thought the Science Bowl would be an amazing opportunity to do so. Science Bowls were never something I participated in as a student, and frankly I was quite curious and expected to test my knowledge a bit. Warned in advance, I realize I have some breadth to make up in different topic areas and am incredibly impressed by the student's knowledge base.

Many people are passionate about volunteering for a variety of reasons. For me, the student's passion and excitement to participate is absolutely infectious and reminds me why I chose this path – science evokes the same feeling for me. In some ways, it's quite selfish since I feel that the students give so much more to me than I can give them volunteering my time. For this reason alone, volunteering my time for STEM activities is absolutely the best return on investment.

Given the breadth of volunteers for the event, it was a great opportunity to chat with other scientists. The format of being paired with a variety of other individuals for this event gave the volunteers also enough of an opportunity to discuss and interact.

The breadth of topics covered, speed at which they must answer, and the ability to compete as both an individual, as well as part of team is an awesome opportunity for students.



*A student from Carlton High School poses for a photo Photo by Dave Newell*



*Students from St. Paul Academy gather for a group photo before a match*

*Photo by Dave Newell*



# Volunteers, Judges, and Reviewers Needed

## STATE SCIENCE & ENGINEERING FAIR

*Date: Saturday, March 21*

Judges are needed to evaluate student projects and provide feedback to students on their research and presentation skills. Not only do judges have fun helping out and encouraging students to pursue science and engineering, this is an excellent opportunity for networking and developing evaluation skills.

Please visit <http://mnmas.org/science-engineering-fair/judges> for details and to register.



## HIGH SCHOOL STEM COMMUNICATOR AWARDS

*Date: Early April, online reviewing*

The High School STEM Communicator Awards program needs volunteer judges to review papers submitted to the program. Volunteers read two or three papers within their area of expertise and respond electronically to student work. Papers will be sent out at the end of March and readers will have approximately three weeks to review the papers.

If you are interested in volunteering, please email the Program Coordinator, Karen Newell, at [karennewell@mnmas.org](mailto:karennewell@mnmas.org).



# Financial Report

**Minnesota Academy of Science  
Statement of Financial Position  
Fiscal Years Ended June 30, 2014 and June 30, 2013**

<b>ASSETS</b>	6/30/14	6/30/13
Checking/Savings	\$ 216,375.00	\$ 259,981.00
Grants and Accounts Receivable	\$ 69,581.00	\$ 25,168.00
Other Assets	\$ 5,487.00	\$ 8,080.00
Total Assets	\$ 291,443.00	\$ 293,229.00
<b>LIABILITIES AND NET ASSETS</b>		
Accounts Payable	\$ 5,694.00	\$ 54,094.00
Other Liabilities	\$ 3,264.00	\$ 7,380.00
Total Liabilities	\$ 8,958.00	\$ 61,474.00
Unrestricted Net Assets	\$ 272,309.00	\$ 215,532.00
Temporarily Restricted Net Assets	\$ 10,176.00	\$ 16,223.00
Total Net Assets	\$ 282,485.00	\$ 231,755.00
<b>TOTAL LIABILITIES AND NET ASSETS</b>	<b>\$ 291,443.00</b>	<b>\$ 293,229.00</b>

**Minnesota Academy of Science  
Statement of Activities  
Fiscal Years Ended June 30, 2014 and June 30, 2013**

<b>REVENUE</b>		
Contributions*	\$ 295,726.00	\$ 195,716.00
Program Revenue	\$ 124,792.00	\$ 119,984.00
Investment Income	\$ 296.00	\$ 362.00
Miscellaneous Income	\$ 845.00	\$ 63.00
Total Revenue	\$ 421,659.00	\$ 316,125.00
<b>EXPENSES</b>		
Program Expenses	\$ 307,606.00	\$ 283,043.00
Administrative and Fund raising	\$ 63,322.00	\$ 58,584.00
Total Expense	\$ 370,928.00	\$ 341,626.00
<b>NET REVENUE OVER EXPENSE*</b>	<b>\$ 50,731.00</b>	<b>\$ (25,501.00)</b>

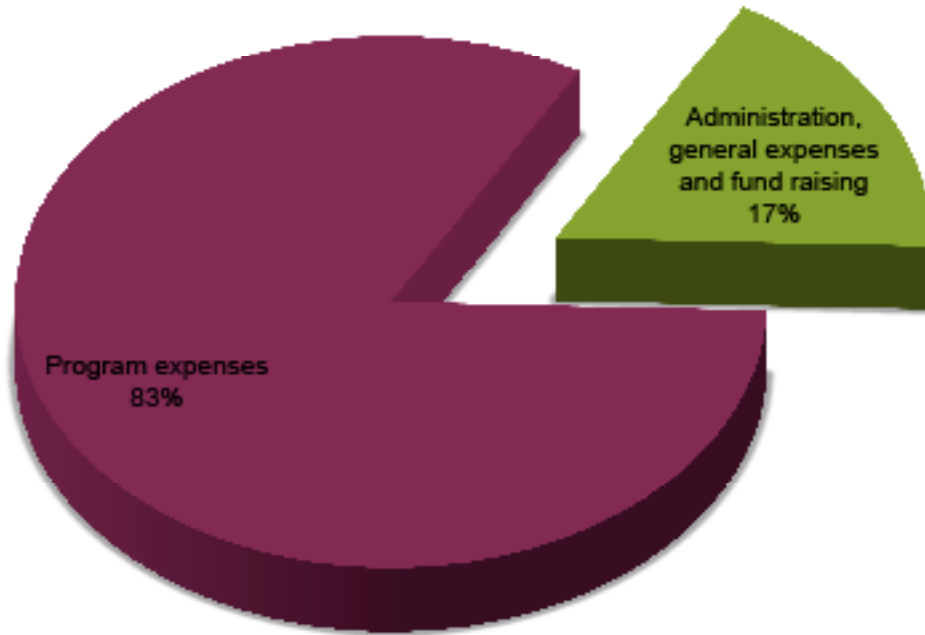
\*Generally Accepted Accounting Principles require two-year grants to be taken into income the year they are committed creating an artificial deflation of revenue over expense the second cycle year (2013 )and an artificial inflation of revenue over expense in the first cycle year (2014).



# Financial Report (Cont.)

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## 2014 Functional Expenses



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## 2014 Functional Expenses

<b>Administration, general expenses and fund raising</b>	<b>63,322</b>
<b>Program expenses</b>	<b><u>305,306</u></b>
<b>Total Functional Expenses</b>	<b><u>368,628</u></b>

# Thank You to Our Funders and Corporate Sponsors

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Thank you to our individual donors for their generosity and to our members for their support.

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A special thanks to Dave Newell for volunteering as the Event Photographer for multiple events.

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