Dear Science Bound Friend,

We are pleased to share with you the 2014-2015 Science Bound Annual Report! As you may recall, Iowa State University Science Bound is the premiere program in the state of Iowa designed to prepare ethnically diverse students for degrees and careers in Science, Technology, Engineering, and Mathematics (STEM) fields. As we enter our 25th year, we truly appreciate your support and partnership in preparing the next generation of leaders in STEM.

While this report showcases the events, activities, and accomplishments for the past school year, we are off to a strong start in 2015-2016. We are currently serving:

- **400 students and their families in 19 schools in three school districts**
- **282 students in Des Moines**
- **64 students in Marshalltown**
- **64 student in Denison**
- **129 students on the Iowa State campus (99 on Science Bound scholarship)**

Sincerely,

Connie Hargrave, Ph.D.
Associate Professor
School of Education

Denice Ross Haynes, Ph.D.
Interim Director
The year is 1990.

The cost of a gallon of gas is $1.34.

The space shuttle Discovery places the Hubble space telescope into orbit. George H. W. Bush is president.

In this year, the U.S. population is 248,709,873 according to the U.S. Census Bureau (1990), with 22 percent of those individuals identifying as Black, American Indian or Hispanic. At the same time, the country’s mood is shifting regarding what it will mean to be a prosperous nation in the coming years. In an article by Michael E. Porter in the Harvard Business Review (March-April, 1990), he captures the economic thinking of the time:

“NATIONAL PROSPERITY IS CREATED, NOT INHERITED …. A NATION’S COMPETITIVENESS DEPENDS ON THE CAPACITY OF ITS INDUSTRY TO INNOVATE AND UPGRADE.”

In the wake of this shift, the US considers whether the workforce exists to support a move from manufacturing. Could the 12 percent of Whites age 18 and over, and the less than 1 percent of Blacks and Hispanics of the same age who are obtaining advanced degrees (4 years of college) fill this new technological need? (U.S. Census Bureau, 1991)

One might think that farm states like Iowa would care little about these national concerns. Still recovering from the farm “bust,” would the nearly 2.75 million Iowans take up this challenge? And would diversity and inclusion be an issue, since less than 1 percent of Iowa’s population identified as Black, American Indian or Hispanic? (U.S. Census, 1991.)

The answer was yes, at least at Iowa State University. Not only did Iowa State embrace the nation’s focus on innovation, but it also answered the call for increased worker diversity in science, technology, engineering and mathematics (STEM) fields. What would be the vehicle for addressing the educational needs of a new cadre of future STEM professionals?

Science Bound.

ISU President Martin Jischke learns from Science Bound students how to control robots remotely.
The concern is that ethnically and racially diverse students have a stagnant rate of college enrollment and entrance into STEM disciplines (National Science Foundation, 2007). As a case in point, the National Action Council for Minorities in Engineering (2014) found that individuals from populations considered underrepresented in the sciences were only approximately 10 percent of employed engineers, and less than 9 percent of engineering teaching professors in every category (whether full, associate or assistant professorships).

These sobering statistics express a clear need for continuing action and informal education programs that increase the educational achievement and preparation of students of color to study in STEM fields. Iowa State University’s Science Bound is still meeting this need.

This annual report provides a program overview, 2014-2015 program highlights, as well as site-specific reports for Denison, Des Moines, Marshalltown, and Iowa State.
Since its inception, the purpose of Science Bound has been to increase the number of Iowa youth pursuing STEM degrees from populations considered underrepresented in the sciences according to the National Science Foundation (primarily Black, Latino and Native American). Additionally, Science Bound has been a collaboration between families, school district teachers and administrators, community supporters, and Iowa State University faculty, staff and students.

The Science Bound model (Figure 1) is a four-way partnership among businesses and corporations, school districts, students and families, and Iowa State University. This model provides informal STEM education with strong ties to the schools. As a result of these strong ties, a space is created where a strong emphasis on academic preparation and excellence can be cultivated, and where natural venues for students and families to access higher education can be developed.

The program’s activities focus on:
- **Exposing** students to STEM disciplines and careers.
- Providing students with personally engaging experiences with STEM content.
- **Equipping** students with the academic knowledge/skills and self-efficacy to navigate and negotiate higher education.
For the past 24 years, Science Bound has implemented and developed best practices related to college preparatory programs, youth development and parent empowerment tailored to students and families of color. Science Bound has a long history of:

- Developing student interest in, and pursuit of, STEM careers;
- Increasing student academic performance in science and math;
- Increasing parent and family involvement in school-based academic activities;
- Increasing college attendance and completion rates;
- Developing and implementing thriving business-district-university-community partnerships to foster STEM education;
- Educating students and parents about college and career planning;
- Raising teachers’ expectations of the academic abilities and career aspirations of students of color, and developing their cultural competency;
- Engaging students with more rigorous course expectations and academic support;
- Partnering with researchers and laboratories to offer in-depth STEM learning opportunities (i.e., corporate internships, laboratory research experiences, field-based research experiences, etc.) for Iowa students of color;
- Providing meaningful opportunities for students of color to observe and participate in science and technology careers, and interact with professional scientists, engineers, and technologists;
- Making tuition scholarships to students who complete the program and major in a STEM field at ISU;
- Providing training and mentoring for students in personal responsibility and empowerment.

Much of Science Bound’s student development success hinges on its culture of high expectations, expressed in this five-step diagram (Hargrave, 2015).
Student selection is based on mean or above average performance on standardized tests, demonstrated propensity in math or science, and teacher recommendations of potential and interest in math and science. Each school has at least one Science Bound teacher who meets regularly with the students to conduct science experiments, take field trips, discuss student course selection, and increase the academic skills and achievement of his or her students.

Science Bound students must complete college preparation courses, maintain a minimum grade point average of 3.0, participate in at least 75% of program activities, and meet related program requirements to advance through the program.

Students who successfully complete the 5-year Science Bound program earn a 4-year tuition scholarship to study in a STEM field at Iowa State University.

After completing the 5-year Science Bound commitment, participants have:

- Engaged in a minimum of 120 hours of out-of-school, hands-on science experiments and activities including designing, conducting, and presenting a science fair project;
- Participated in 15 different STEM laboratory activities on the ISU campus with university professors, scientists, engineers, and graduate students;
- Conducted four major career exploration projects to determine the areas of STEM in which she or he is most interested and that best fits his or her skill sets;
- Given a minimum of four formal presentations on his or her STEM preparation and career plans and aspirations.

More than 40 teachers provide regular and ongoing mentorship to students in the program. Corporate and foundation partners provide financial support for the pre-college program activities, and provide key personnel connections, for students and families in their respective communities.
Science Bound Numbers and Retention: Denison, Des Moines and Marshalltown 2015

<table>
<thead>
<tr>
<th>Total</th>
<th>Class of</th>
<th>ALL DISTRICTS</th>
<th>F14</th>
<th>S15</th>
<th>Retention 2014-15</th>
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</thead>
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<tr>
<td>2015</td>
<td>55</td>
<td>49</td>
<td>89%</td>
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<tr>
<td>2016</td>
<td>79</td>
<td>68</td>
<td>86%</td>
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<tr>
<td>2017</td>
<td>75</td>
<td>65</td>
<td>87%</td>
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<tr>
<td>2018</td>
<td>87</td>
<td>78</td>
<td>90%</td>
<td></td>
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<tr>
<td>High School</td>
<td>296</td>
<td>260</td>
<td>88%</td>
<td></td>
<td></td>
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<tr>
<td>Middle School</td>
<td>116</td>
<td>103</td>
<td>89%</td>
<td></td>
<td></td>
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<tr>
<td>All Districts</td>
<td>412</td>
<td>363</td>
<td>88%</td>
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</tbody>
</table>

Funding year 2015 was transitional for Science Bound and brought new opportunities for growth and expansion. With the dissolution of Iowa State’s Institute for Physical Research and Technology, we now call the College of Human Sciences’ School of Education our home. During this period we also relocated to new space in Gilman Hall and negotiated two key partnerships.

As a result, our anticipated outcomes for this period were to smoothly transition into our new university unit and location and exceed collaboration expectations while delivering exemplary programming to our students and families. These outcomes were realized. As we concluded our first year in our institutional and physical homes, we continued to meet supporter expectations. Our highlights for 2015 include:

- **High student retention**, with all districts having rates above 86 percent;
- **Research productivity**, including an article accepted in the Journal of Negro Education, a chapter in a book on leadership in multicultural education, and research on Science Bound’s history;
- **Record-high number** of Science Bound first year students enrolled at Iowa State (n=39);
- **Full-time leadership**, with Dr. Denice Ross Haynes serving as Science Bound’s interim director, and the addition of our own fiscal manager – Tracie Miller.
**RETENTION**

Student retention is a result of exemplary programming delivered by excellent educators. With 5 full-time staff (including the acting director), Science Bound achieves its success through excellence in program delivery. The following were components of the 2014-2015 Science Bound program:

<table>
<thead>
<tr>
<th>Program/Activity</th>
<th>Grade level(s)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algebra Champions</td>
<td>8</td>
<td>Summer Science Bound orientation and math primer program (2 weeks)</td>
</tr>
<tr>
<td>SCIENCE BOUND</td>
<td>8</td>
<td>Orientation to Science Bound program for students only</td>
</tr>
<tr>
<td>Middle School Kick-Off</td>
<td>8</td>
<td>Introduction of program expectations and academic year schedule for students and parents</td>
</tr>
<tr>
<td>Middle School Environmental Science Retreat</td>
<td>8</td>
<td>Environmental science and goal setting retreat</td>
</tr>
<tr>
<td>Middle School Science Fair</td>
<td>8</td>
<td>Individual science research projects designed, conducted, and presented by Science Bound students</td>
</tr>
<tr>
<td>Middle School Science Bound Essay &amp; Crossover Ceremony</td>
<td>8</td>
<td>Reflective essay completed by each student articulating STEM career aspirations and educational goals. Formal high school Science Bound admission ceremony.</td>
</tr>
<tr>
<td>Saturday ISU Visits</td>
<td>8</td>
<td>Three campus visits for experiential STEM activities</td>
</tr>
<tr>
<td>Parent Programs</td>
<td>8-12</td>
<td>Two each year per district</td>
</tr>
<tr>
<td>Learn &amp; Earn</td>
<td>9-11</td>
<td>Summer 4-week academic boot camp</td>
</tr>
<tr>
<td>High School Kick-Offs</td>
<td>9-12</td>
<td>Introduction of program expectations and academic year schedule for students and parents</td>
</tr>
<tr>
<td>High School Oral Justifications</td>
<td>9-12</td>
<td>Formal presentation given by each student to demonstrate individual learning and program commitment</td>
</tr>
<tr>
<td>High School Curriculum</td>
<td>9-12</td>
<td>Science and technology career exploration, study skills, team-building, hands-on science experiences and field trips</td>
</tr>
<tr>
<td>Catalyst Leadership Program</td>
<td>9-12</td>
<td>Leadership development program for students</td>
</tr>
<tr>
<td>Countdown to College</td>
<td>12</td>
<td>College admissions and enrollment workshop for students and parents; 8 sessions</td>
</tr>
<tr>
<td>Teacher Inservice Opportunities</td>
<td>Middle &amp; high school teachers</td>
<td>Fall retreat, mid-year, and closing sessions</td>
</tr>
<tr>
<td>ISU Freshmen Seminar</td>
<td>Undergraduate</td>
<td>Two 16-week sessions</td>
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<tr>
<td>Ambassador Program</td>
<td>Undergraduate</td>
<td>ISU science majors trained to conduct demonstrations at schools and serve as role models</td>
</tr>
</tbody>
</table>
While many of the Science Bound components are tailored to meet the needs of the students and families in each district (e.g. orientations, kick-offs, retreats, science fairs, parent programming and school-based programming), others are delivered consistently across all districts. These include such programs as:

**SCIENCE BOUND SATURDAYS.**

On two Saturdays in the fall, and one in the spring, more than 400 Science Bound students and teachers travel to Iowa State where Science Bound and Iowa State faculty, staff and students host them for a half day of experiential STEM activities in labs and research facilities across ISU’s campus.

In the past year, more than 40 activities were hosted by over 100 faculty, staff and ISU student volunteers, providing programming in these areas:

- Analytical chemistry
- Forensics anthropology
- Industrial design
- Agronomy
- Polymer chemistry
- Wind energy
- Biorenewables
- Odor investigation
- Google earth research
- Engineering activities
- Planetarium
- Plant genetics (3)

- Agriculture
- Blood splatter forensics
- Spider silk material
- Aircrafts and ice
- Earthquakes and structures
- Toxicology
- Agricultural and biosystems engineering
- Nanochemistry
- Savvy evidence
- Materials engineering
- Robotics
- Electrical engineering
- Global agriculture
- Wind energy
- Spacial scales and microscopy
- Soil investigation
- Animal anatomy
- Entomology
- Biofuels
- Construction engineering
- Food science
- Solar energy
- Natural resources and environmental sciences
- Physics
- DNA extraction

**COUNTDOWN TO COLLEGE.**

Developed over the last 8 years, Science Bound brings college-going information and assistance directly to Science Bound students and families. Topics include applying for college admission and scholarships, budgeting, housing, financial aid, summer bridge programs and more. Fifty-four students successfully completed the program.

**ALSO, AS IN PREVIOUS YEARS,** Science Bound continues to experience:

- **Strong teacher commitment** in all three districts as demonstrated by high teacher retention in all districts;
- **High levels of steady parent participation** across all three districts, with many events having standing room only;
- **Better articulation of academic and career goals by student** participants in essays and oral justifications through a more rigorous essay and oral justification curriculum;
- **High matriculation of students** who have participated in Science Bound to higher education (100 percent of our 2015 graduating class planned to attend a post-secondary institution in fall of 2015);
- **High retention of Science Bound students at Iowa State** (the 2014-2015 retention rate was 96 percent for all undergraduates);
- **Increased number of Science Bound students graduating** from ISU (10 graduated in 2015, bringing the program total to 95, with 67 earning STEM degrees);
- **Solid program delivery** to more than 400 diverse students and families through teacher and district support, as well as through a staff composition that allows for timely response to questions and concerns.
RESEARCH PUBLICATIONS
Science Bound adheres to best practices and creates new, innovative practices through programmatic evaluation and research. At times, this work benefits not only Science Bound students and families, but also contributes to the body of knowledge related to multicultural college preparatory programs. Two of this year’s publication highlights include:


FIRST FULL TIME DIRECTOR
Denice Ross Haynes, Ph.D., became Science Bound’s first full-time director in November, 2014. Haynes managed the program’s transition while keeping it on target to fulfill its commitments to the more than 400 students and families in three cities, and working with more than 100 Science Bound students at Iowa State. Connie Hargrave is expected to return to the position half time in the spring of 2016.
TWENTY-FIVE YEARS
AND COUNTING:
THE DES MOINES PROGRAM

STUDENTS FROM THE DES MOINES PROGRAM AT IOWA STATE UNIVERSITY IN 2014 (ABOVE)
AND THE DES MOINES GRADUATING CLASS OF 2015 (BELOW).
A high school-to-college bridge program in Missouri, and an Iowa State chemistry professor, were the catalysts for what would become Science Bound.

After a few years of a pilot project and a National Science Foundation grant, Science Bound was launched by Iowa State University, the Des Moines public schools and local corporate sponsors.

DESMOINES DISTRICT DATA

Today Des Moines Public Schools (the largest school district in the state, with 33,553 students) is comprised of 57 percent non-White students. Within this large population of students of color, 32 percent are Black and 43 percent are Latino (Iowa Department of Education, 2014). Five high schools and 10 middle schools are part of the Des Moines Science Bound program, with more than 35 teachers involved in district program delivery. Des Moines Science Bound impacts approximately 300 of the district’s 8-12th grade students directly, and approximately 6,200 students systemically when Science Bound teachers engage daily in classroom instruction, and employ the skills and cultural competencies they develop through Science Bound.

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<thead>
<tr>
<th>Des Moines Student Numbers and FY2015 Retention</th>
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<td>Totals</td>
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<td>Middle School</td>
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<td>All Districts</td>
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MIDDLE AND HIGH SCHOOL PROGRAMS

Students meet regularly with district teachers and school administrators who become part of the Science Bound student support team. At the middle school level, students meet twice each month. During high school, students meet with their Science Bound instructors weekly.

Following is a summary of some of the activities that middle and high school Science Bound students participated in during their school-based meetings, 2014-2015:

- Career exploration projects
- Journaling
- Oral justification preparation and presentations
- Chemistry soap lab activity
- Interviewing skills workshop
- Academic checks
- Business etiquette (email and phone) workshop
- NASA Orion Mission activity
- Scientific inquiry activity
- DuPont Challenge writing experience
- Brain Games Olympics
- Bioethics workshop
- Community Night – cockroach races
- Team building day (balloon furniture)
- Robotics workshop
- Science lesson for middle school
- Science fair project development and presentation
- Reflective essay preparation and writing
- Three-week Algebra Champions summer orientation and academic preparation for 77 rising 8th grade students
- Four-week Learn and Earn summer academic boot camp (121 students participated)
- Crossover ceremony for 8th grade students who successfully complete first year of program
Science Bound is a door of opportunity for Elsa Reyes and Valerio Ramirez, the parents of Science Bound students Alam, Alex and Aleyda Ramirez. Although they are involved in other extracurricular activities, including band and taekwondo, Science Bound gives these young people hope for furthering their post-secondary education.

Alam, a student at Roosevelt High School, was encouraged by one of his teachers to join Science Bound. “My favorite part of Science Bound is getting to meet and talk to the people at the university,” said Alam. He wants to study agriculture when he goes to Iowa State and hopes to make plant growth more efficient. His interest in agriculture is reflected through his enrollment in AP biology, and he also grows plants in his room at home.

Fifteen-year-old Alex followed in his brother’s footsteps by joining the Science Bound program, but his interests were more in computer science. Alex has furthered his interest in computers through learning how to code and program. For Alex, Science Bound has been a way to open many doors for his future. “Science Bound gives leverage for other opportunities,” he said.

For the Reyes-Ramirez family, Science Bound is a resource for the entire family, even for their 12-year-old daughter who just joined Science Bound. “Through the Science Bound meetings my husband and I have learned a lot about college and the process for getting there,” said Reyes. “Science Bound represents a hope to show my children the path to go to college.”
Smithfield Foods and Farmland Foods funded the establishment of the Denison Learners to Leaders Science Bound program in the fall of 2007.

**DENISON DISTRICT DATA**

The first class of Denison students completed the Science Bound program in May 2012. Denison Public Schools, with 2,224 students, is comprised of 61 percent Latino youth (Iowa Department of Education, 2014). Science Bound serves nearly 8 percent of the 8th through 12th grade student population in Denison. The Denison program is led by three teachers at the high school level, and two at the middle school level.

<table>
<thead>
<tr>
<th>Denison Student Numbers and FY15 Retention</th>
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<tr>
<td><strong>Totals</strong></td>
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<td>Middle School</td>
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<td>Program</td>
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STUDENTS FROM THE LEARNERS TO LEADERS SCIENCE BOUND PROGRAM IN DENISON POSE ON THE STEPS OF BEARDSHEAR DURING AN IOWA STATE VISIT.
DENISON MIDDLE AND HIGH SCHOOL PROGRAMS.

The middle school year began with an orientation program for incoming 8th grade students, led by Iowa State Science Bound staff. During the orientation students learn The Science Bound Way:

the importance of leaning into learning, of accepting “Nothing Less Than Success,” and of committing to developing the skills necessary for personal achievement.

The orientation program was followed by an all-family members kick-off (one for middle school students and families, and one for high school students and families), which provided participants with an overview of the year’s upcoming events.

Denison middle school students then met bi-weekly with their Learners to Leaders Science Bound instructors (district teachers who lead the program on site).

High school students had weekly meetings. The Denison high school teachers continued to improve the family-style organization of the program. This effective approach facilitates small group interactions and experiences, brings incoming-freshmen into dynamic interactions with upperclassmen, and supports leadership development for senior high participants.

Following is a summary of the major activities middle and high school Learners to Leaders Science Bound students participated in during 2014-2015:

- Forensics presentation
- Forensics science unit by the high school program, which culminated in a forensics demonstration for their families
- Scientific method application activities
- Scientific inquiry and science fair project development and presentation
- Electrical engineering and agricultural careers activities, including egg drop and boat building competitions, and a wind speed activity at Iowa State
- Environmental sciences and academic goal setting overnight experience at Springbrook State Park
- Mentoring Circles with staff from Farmland Foods. Mentoring Circles is a 5-session, structured curriculum that brings small groups of students together with STEM professionals to support student STEM professional development.
- Tutoring opportunities
- Local job shadowing
- Academic enrichment programs, some at ISU. During the summer of 2015, five students attended the Early Outreach Program, and nine students participated in VetBound to help meet Science Bound’s summer academic participation requirement (see article on page 17).
- Crossover ceremony for 8th grade students who successfully completed the program
- Honors banquet for high school seniors graduating from the program, as well as students receiving awards for exemplary participation in the program and high grade point averages.

Other highlights include:
- Thirty-nine percent of SCIENCE BOUND students in Denison had a 3.75 grade point average or above;
- Nine students were on track to qualify for the Science Bound scholarship in the fall of 2016.
DENISON STUDENTS ARE VET(ERINARY SCIENCES) BOUND

“I learned a lot about science.”
“My focus was on learning, and having fun. I’m grateful I did both.”
“It was a mind-blowing and eye-opening experience.”

These are just a few of the comments made by the nine Learners to Leaders Science Bound students from Denison High School who participated in VetBound, an activity hosted and sponsored by the U.S.D.A. Veterinary Services Laboratories in Ames in May.

Scientific Outreach Coordinator Dr. Janet B. Payeur welcomed the students. The activities were focused on veterinary and animal science and included suturing, identifying species and analyzing x-rays. “My favorite part was the activity where we got to draw blood, because you get to see how the vets actually do it,” said sophomore Jonathan Lara.

VetBound was developed as a special collaboration between Science Bound and the U.S.D.A. to increase student interest in animal science. This is VetBound’s third year, but was the first for Denison High School students.
In 2005, the Marshalltown Science Bound program began with pilot funding through a National Aeronautics and Space Administration grant. The Marshalltown program was formally launched in 2007 with financial support from local corporations and foundations such as the Martha Ellen Tye Foundation and Emerson Process Management, Fisher.

MARSHALLTOWN DISTRICT DATA
In 2014, the Marshalltown Community School District had 5,075 students, 50 percent of whom are Latino. Science Bound students represent nearly 5 percent of the 8th-12th grade student population.

<table>
<thead>
<tr>
<th>Marshalltown Student Numbers and FY15 Retention</th>
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<td>Totals</td>
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<td>Middle School</td>
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<td>Program</td>
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MIDDLE AND HIGH SCHOOL PROGRAMS.

Both the middle and high school Science Bound Kick-Off events were held in September. Families and students met program facilitators, received an overview of the academic year program from the teachers, and were re-introduced to the program's philosophy and goals while they networked with other Science Bound families. The kick-offs were followed by two parent meetings hosted by Iowa State Science Bound staff over the course of the academic year. During these meetings families were introduced to the scientific method, they developed new strategies for engaging their young people academically, and they learned about the value of summer STEM experiences. Additionally, students from Iowa State’s Society of Hispanic Professional Engineers provided hands-on science experiences for youth during the fall parent meeting.

Following is a summary of the activities middle and high school Marshalltown Science Bound students participated in during 2014-2015:

- Environmental sciences and academic goal setting overnight experience at Springbrook State Park
- Eighth Grade “Nothing Less Than Success” Science Bound Science Fair, hosted by Emerson Process Management, Fisher at their Innovation Center, where their engineers served as judges.
- Shadow Day, with Marshalltown juniors and seniors joining students from Denison and Des Moines. Shadow Day is an opportunity for upper-level high school Science Bound students to visit the ISU campus for the day and “shadow” an undergraduate majoring in a scientific or technical degree program. In addition, students met with advisors, learned about navigating the freshman year and financial aid resources, and visited residence halls.
- Oral justification presentations, which provide high school Science Bound students with an opportunity to reflect on and communicate about their Science Bound experiences
- Trip to the Blank Park Zoo, where the young people learned about opportunities for internships at the zoo and career options available to work with animals in a zoo setting
- Mentoring Circles (a 5-session, structured curriculum that brings small groups of students together with STEM professionals around specific topics) were implemented for the first time with Emerson Process Management, Fisher. The culminating activity was a plant tour (see article below).
- Participation in study tables and tutoring opportunities

Other highlights include:

- Seven students were recognized for successfully completing the high school Science Bound program at this year’s Honors Banquet;
- The first two Science Bound graduates from Marshalltown received degrees from Iowa State;
- Ten Science Bound graduates from Marshalltown will be on the ISU campus in fall of 2015.

MENTORING CIRCLES PREMIER IN MARSHALLTOWN

‘men-tor (noun) someone who teaches or gives help and advice to a less experienced and often younger person (Merriam-Webster Dictionary)

‘men-tor-ing ‘cir-cles (noun) science, technology, engineering and mathematics professionals give advice and guidance to small groups of Science Bound students destined to become science, technology, engineering and mathematics (STEM) professionals (Science Bound)

During the fall of 2014, upperclassmen in the Marshalltown High School Science Bound program participated in Mentoring Circles with personnel from Emerson Process Management, Fisher and DuPont Pioneer. During the fall, the Mentors joined the Science Bound after school program and spoke with small groups of students, sharing their STEM stories and covering such topics as pathways to success, obstacles and triumphs, and goal setting.

The culminating activity was a trip to Emerson. The plant tour, hosted by Emerson staff (some of whom had served as mentors), included research presentations along with a conversation about finding a co-op position at Emerson.

The Mentoring Circles program is an outgrowth of focus group conversations held with families in Science Bound districts. “We found that often students and families did not have access to STEM professionals in any of their interactions,” said Connie Hargrave, Associate Professor in the School of Education. “At the same time, we know that professionals often can’t make long-term meeting commitments. Mentoring Circles make STEM professional information more accessible to our youth, and they make it easier for STEM professionals to be engaged with young people who want to follow in their footsteps.”
IOWA STATE GRADUATES AT THE SCIENCE BOUND BANQUET WERE RECOGNIZED FOR THEIR SUCCESS. FROM LEFT OF THE FLAG BEARER: ROMINA VIDAL, GEOLOGY; ALMA MARQUEZ, CHEMICAL ENGINEERING; CAROLINA RODRIGUEZ, GENETICS; BACK: LATIA ROBINSON, PRE-MED PSYCHOLOGY; KEVIN QUINTEROS, ANIMAL ECOLOGY; ALEXIS TOWNSLEY, KINESIOLOGY AND HEALTH.
The goal of Science Bound at the pre-college level is to prepare and motivate students to pursue and earn college degrees in science-related fields.

As a result of these efforts, the number of Science Bound students who enroll in college continues to grow, as does the number who enroll at Iowa State.

**Ninety-eight percent** of students who complete the 5-year Science Bound program enroll in college immediately after high school. Nearly 60% attend Iowa State.

<table>
<thead>
<tr>
<th>FY2015 ISU Program Report: By the Numbers</th>
<th>Fall 14</th>
<th>Spring 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scholarship recipient (STEM majors)</td>
<td>78</td>
<td>77</td>
</tr>
<tr>
<td>Non-SCIENCE BOUND Scholarship</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>TOTAL ISU</td>
<td>100</td>
<td>99</td>
</tr>
</tbody>
</table>

**SCIENCE BOUND STUDENT PERFORMANCE AT IOWA STATE**

**First Year Student Retention.**
Science Bound saw 47 students join the Iowa State first year undergraduate ranks in 2014, 40 of whom were on Science Bound scholarship. Of this group only three did not persist, with two not continuing for medical reasons. Two freshmen students enrolled at Iowa State during spring semester.

**Upperclassman Student Retention and Graduation.**
Major highlights for the upperclassman students during the 2014-2015 year included:

- Ninety-eight percent Iowa State retention rate;
- The addition of 10 students to the ranks of Iowa State degree holders, bringing the total number of Science Bound ISU graduates to 95 (with 71% of those students earning STEM degrees);
- The ISU graduation of our first Science Bound students from Marshalltown;
- Acceptance of one of our fall Science Bound Iowa State graduates to the Ph.D. genetics program at Iowa State this fall.

**The Class of 2019 – STEM Strong.**
Iowa State University welcomes 37 Science Bound graduates to campus this fall; 33 having accepted the Science Bound scholarship. The number of Science Bound graduates on Iowa State’s campus this fall will be 129, with 87% pursuing STEM degrees.
Now in its third year of a five-year initiative funded by DuPont Pioneer, Science Bound and the College of Agriculture and Life Sciences (CALS) collaborated to deliver a joint, multifaceted educational program to orient, recruit, and retain students from diverse backgrounds to pursue careers in agbiosciences. The program prepares Science Bound students for undergraduate study in agricultural science majors, enhances students’ skills and knowledge related to agricultural research, and develops leadership skills through unique agriculture-focused experiences. The partnership formally links Science Bound with CALS through Science Bound’s Learn and Earn program and CALS’ George Washington Carver Summer Internship program while building additional opportunities through the Next Generation Leadership program.

Learn and Earn.
This year, as a component of Science Bound’s Learn and Earn summer academic boot camp in Des Moines, three agriculture majors developed and delivered agriculture content as part of the language arts component of the program for the 100 plus student participants. Students explored careers in agriculture, learned about bees, conducted a DNA extraction, and more, all while developing their communication skills.

George Washington Carver (GWC) Summer Internship Program.
Eight Science Bound students from Des Moines and Marshalltown participated in the GWC Summer Internship Program. As part of their summer experience, students worked on research projects in:
- Biochemistry, biophysics and molecular biology
- Natural preservatives, foodborne bacteria, and herb washes
- Zebrafish gene mutation
- Corn residue removal

Next Generation Leadership Program.
Science Bound students who complete the GWC Summer Internship program and enroll at Iowa State University in the College of Agriculture and Life Sciences (CALS) are eligible for the Next Generation Leadership program. The program is anchored by peer mentors, professional staff and graduate students from CALS. Next Generation Leadership Scholars are actively engaged in leadership training and educational activities and operate as a high-functioning cohort of young agbioscience leaders-in-training.

Students can hold the title of Next Generation Leadership Scholar for up to two years beyond the completion of the GWC Summer Internship program. A Next Generation Leadership Scholar can remain in the program for a second year and serve as a Next Generation Mentor. Peer mentoring has been shown to complement and enhance other formal mentoring efforts and contributes to higher rates of retention and academic success.
REFERENCES


• National Science Foundation (October 30, 2007). National action plan for addressing the critical needs of the U.S. science, technology, engineering and mathematics education system.


Science Bound is grateful to you and the following for your generous support.

IOWA STATE UNIVERSITY

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Thank you!