2014

Opening Minds to Science

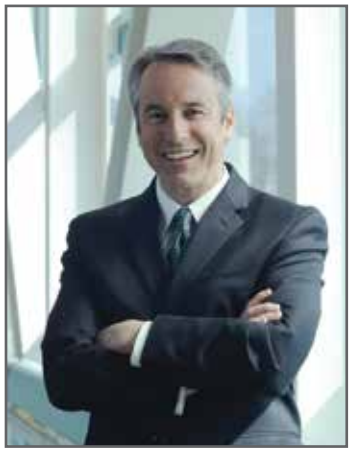
The Saint Louis Science Center's Report to the Community

SAINT LOUIS
sciencecenter


ENERGIZER

From the President and Chief Executive Officer,

Bert Vescolani



Dear Friends, Partners, and Supporters,

I am pleased to share with you the latest edition of *Opening Minds to Science: The Saint Louis Science Center's Report to the Community*. This report presents an overview of what we have learned from and about our visitors in 2014.

As we continue to renovate our exhibits and provide fun and engaging experiences, we rely on visitor feedback as one of the key indicators of how we are doing. As you will see in this report, our visitors enjoyed films, special exhibitions, educational programs, new exhibits, and old favorites. They told us about great interactions with staff and volunteers, and participated in evaluation studies that will help shape future exhibits and programs.

This year's *Opening Minds to Science* report presents an overview of our audiences' demographics and visitation patterns, looks at how visitors talk about the Science Center, examines the impact of our educational programs, and highlights results from recent evaluation studies that are informing the development of one of our new projects, *Bridging Earth and Mars (BEAM),* a NASA-funded exhibit about the Mars rovers.

We hope this report provides you with useful insights about our visitors and how they experience the Science Center.

Sincerely,


DISCOVER
St. Louis Science Center

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Mission and Inspiration

What inspires our work?

The mission of the Saint Louis Science Center is...

To ignite and sustain lifelong science and technology learning.

The Saint Louis Science Center is an informal learning environment where people of all ages and backgrounds engage with science, technology, engineering, and math.

Opening Minds to Science

Our mission inspires us to open minds to science – to develop fun, engaging, interactive, and approachable ways for our audiences to explore STEM (science, technology, engineering, and math) and learn about the world around them. Through exhibitions, educational programs, films, and events, the Science Center provides a variety of ways for people to *ignite* their interest in science and technology and pursue opportunities to *sustain* that interest throughout their lives.

We strive to create experiences that encourage visitors to:

- Make personal connections to their knowledge and experiences
- Embrace a spirit of play and discovery
- Act on their own curiosity
- Form and ask questions, and then seek results
- Engage in hands-on exploration and experimentation
- Participate in conversations about the role of STEM in their lives
- Cultivate science process skills
- Pursue and use science throughout their lives

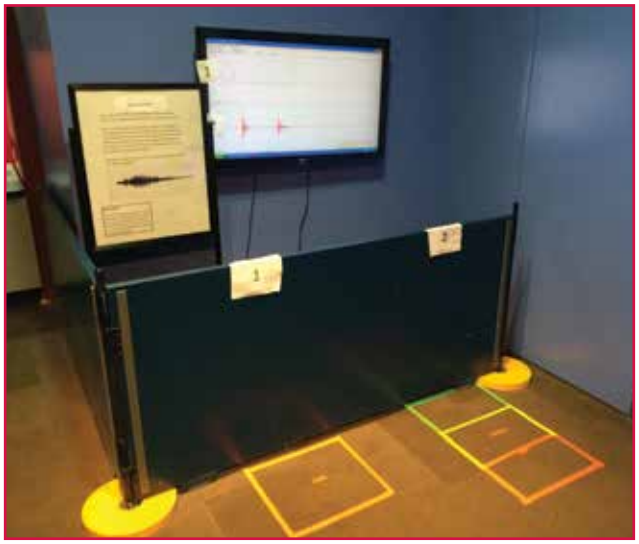
Positive experiences with the Science Center will drive repeat visits and prompt visitors to interact with STEM concepts beyond their visit. Ultimately, we hope to motivate our visitors to think differently about the world around them and empower them to make informed choices in their everyday lives.

Developing Exhibitions and Programs

In order to develop exemplary exhibitions and programs, we ground our processes in best practices in the science center field, current science content, current learning theory, experience design, and visitor studies. We engage with scientists, engineers, and other STEM professionals to inform our work and provide visitors with unique opportunities to interact directly with these experts. As appropriate, we correlate our offerings to national and state curriculum standards. Through evaluation, we assess the effectiveness of our offerings in meeting their learning objectives and we include our audiences and other stakeholders in the exhibition and program development and revision process.

We also actively seek opportunities to turn STEM into STEaM, where the "a" represents the arts. We recognize that the arts can be a powerful tool for interpreting STEM concepts and that integrating the arts into exhibit and programmatic experiences helps make STEM concepts approachable to a wider cross-section of people.

All these elements of the exhibition and program development process strengthen our offerings and broaden the ways in which we can achieve our mission and open minds to science.

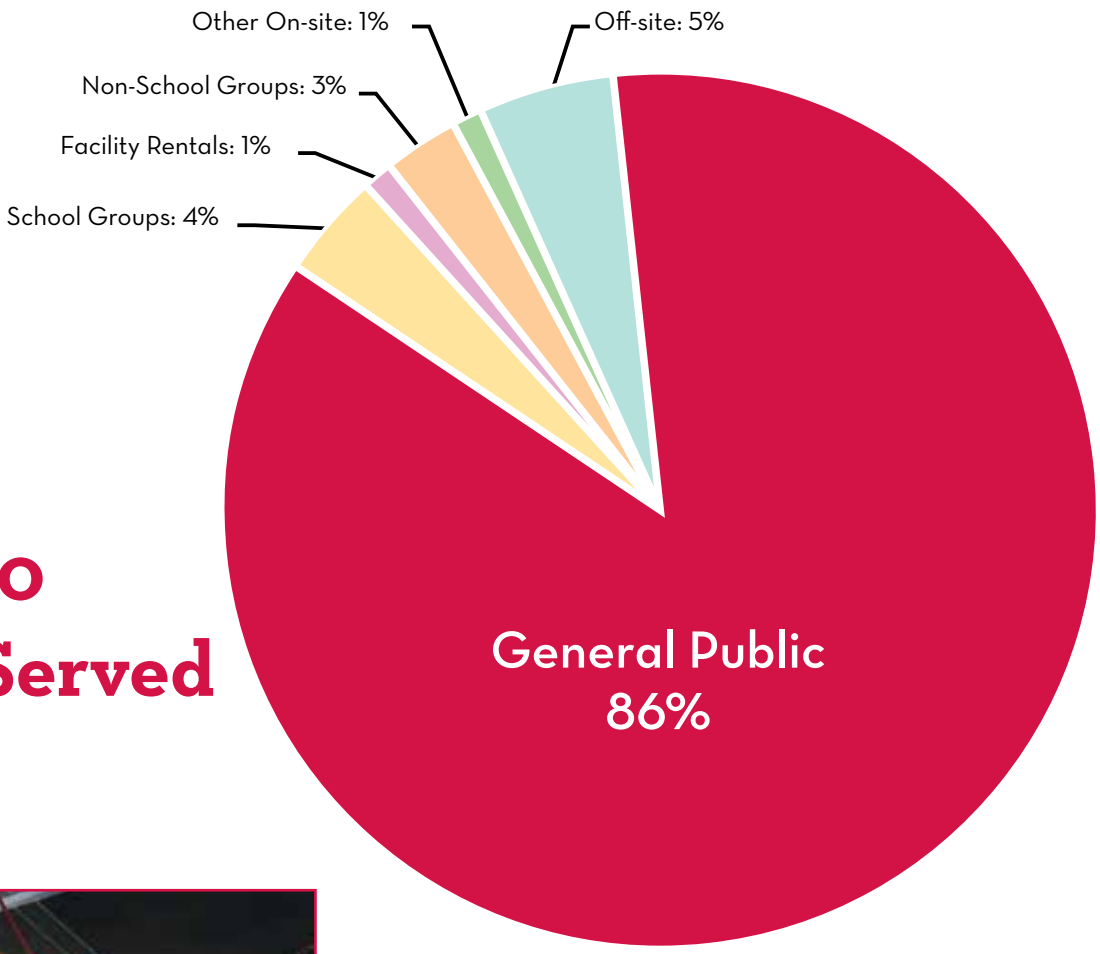


These photos show the progression of development of a new exhibit about seismographs in the *Ecology & Environment* gallery.

People Served

How many people does the Saint Louis Science Center reach?

The Saint Louis Science Center tracks daily attendance through the use of on-site door counters and by tracking attendance at off-site programs.



1,014,100
People Served

In 2014, the Science Center reached 1,014,100 people. The majority, 95% (963,349 people), were on-site visitors. The remaining 5%, (50,751 people), experienced educational programs and community outreach activities at off-site locations such as schools, community centers, and the Challenger Learning Center-St. Louis.

How do we learn about our visitors?

Our visitors and their experiences are central to everything we do at the Saint Louis Science Center. Therefore, we routinely conduct evaluation studies to better understand our visitors and their experiences with Science Center offerings. These studies are designed following best practices in the field of visitor studies. Data are systematically collected, analyzed, and communicated so they can inform decisions about exhibitions, programs, and operations. This is accomplished through methods such as surveys, comment cards, interviews, and observations.

Data presented in this report were collected through a variety of studies, including:

Seasonal exit interviews of adult, general public visitors that provide key information including visitor demographics, visitation patterns, and likelihood of recommending the Science Center.

Comment cards that staff distribute each day to a random sample of visitors throughout the facility with the invitation to "let us know how your visit goes today".

The Science Center's internally developed System for Assessing Mission Impact (SAMI), which collects and summarizes key performance indicators for educational programs.

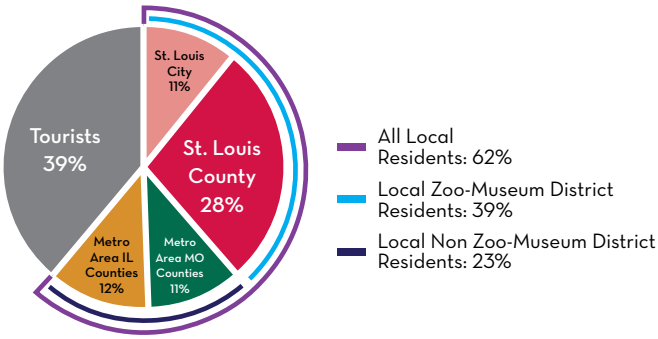
Front-end exhibit and program evaluation studies, which are used by exhibit and program development teams to better understand what our audiences know, don't know, and are interested in learning about related to a particular topic.

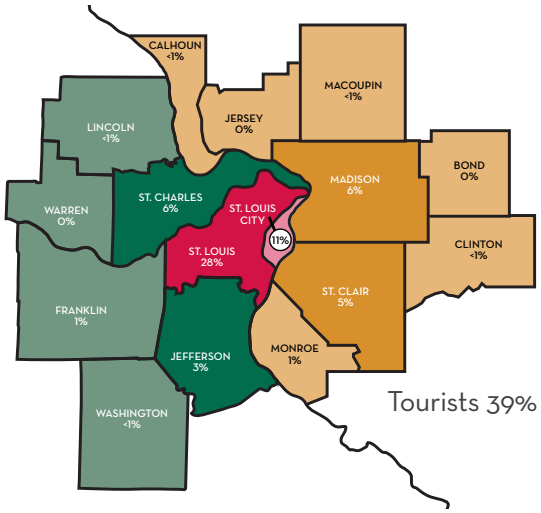
General Public Audience Profile

Who are our visitors?

Three times per year, a randomized sample of our adult, general public visitors are invited to participate in an interview at the end of their visit. These exit interviews occur in the spring, summer, and fall/winter, and provide key information on demographics and visitation patterns. In 2014, a statistically valid sample of 781 visitors were interviewed.

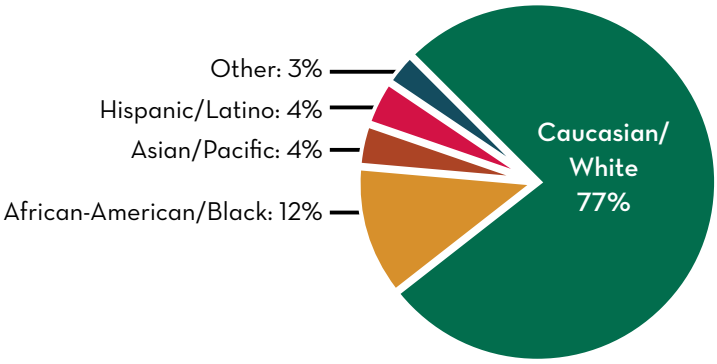
General Public Visitor's Residence





Visitors represented 36 states plus several countries. The majority of visitors (62%) reside in the Metro St. Louis area, including St. Louis City, St. Louis County, and the surrounding Metro area counties in Missouri and Illinois.

Overall General Public Audience Ethnicity



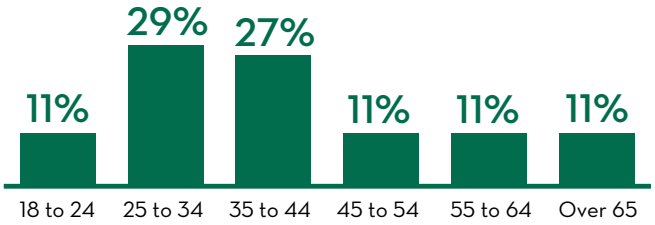
The racial/ethnic distribution of Science Center visitors who reside in the St. Louis area (St. Louis City, St. Louis County, and the surrounding Metro area counties in Missouri and Illinois) is closely matched with the 2013 US Census Bureau data for the St. Louis Metro area (the most recent data available).

	2013 US Census Data for St. Louis Metro Area	2013 Science Center Local Visitors	2014 Science Center Local Visitors
Caucasian/White	77%	73%	74%
African-American/Black	18%	18%	16%
Asian/Pacific	2%	4%	4%
Hispanic/Latino*	3%	3%	4%
Other	3%	2%	3%

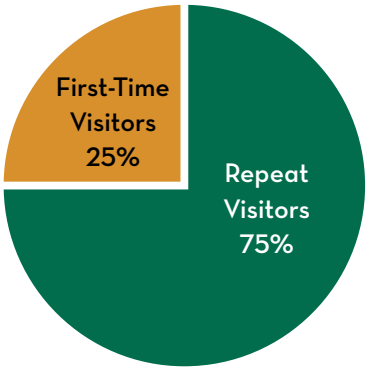
*The US Census tracks Hispanic data separately from race data; total exceeds 100% for the US Census data column.

Group Type

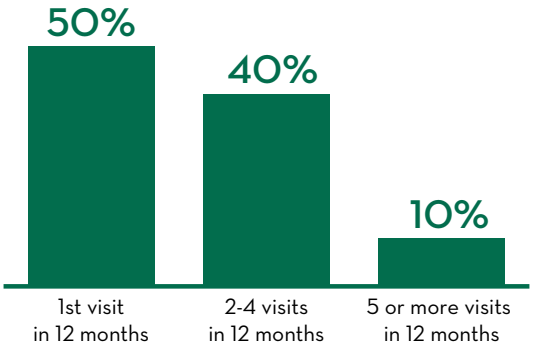
Age Ranges of Adult, General Public Visitors



First-Time vs. Repeat Visitors



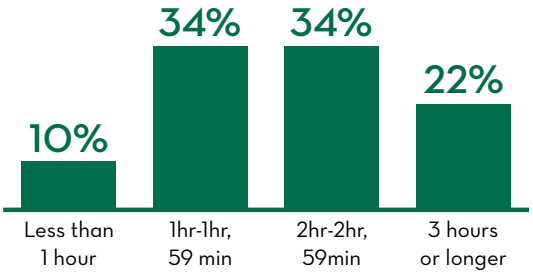
How often do repeat visitors come to the Science Center?



Three-quarters of general public visitors are repeat visitors. On average, these repeat visitors came to the Science Center 2.8 times in the previous twelve months.

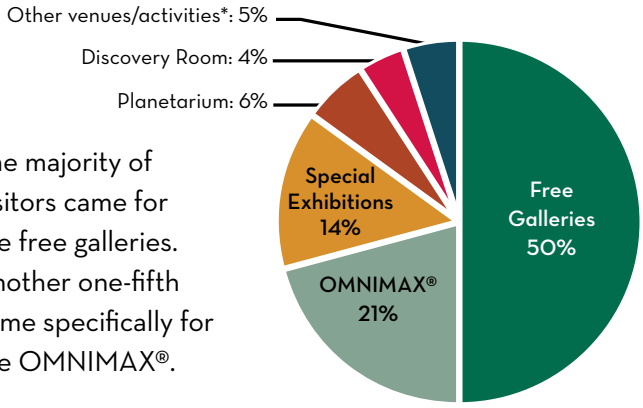
What do visitors do during a typical visit?

How long do visitors stay at the Science Center?



Visitors stay an average of 2 hours, 15 minutes.

Primary Reason for Visiting



The majority of visitors came for the free galleries. Another one-fifth came specifically for the OMNIMAX®.

* "Other venues/activities" includes: the Pulseworks/360° Flight Simulators, the Build-A-Dino® store, LEGO® MINDSTORMS®, paid educational programs, the cafes, and the ExploreStore gift shop.

Areas Visited

(Multiple responses possible; Total exceeds 100%)

*Planetarium gift shop opened July 2014.

Nearly all visitors spend time in the free galleries. The ExploreStore gift shop and the OMNIMAX® are the most heavily visited revenue-generating areas. *Dinosaurs in Motion* and the *The International Exhibition of Sherlock Holmes* were the special exhibitions featured in 2014.

What do visitors say about their Science Center experiences?

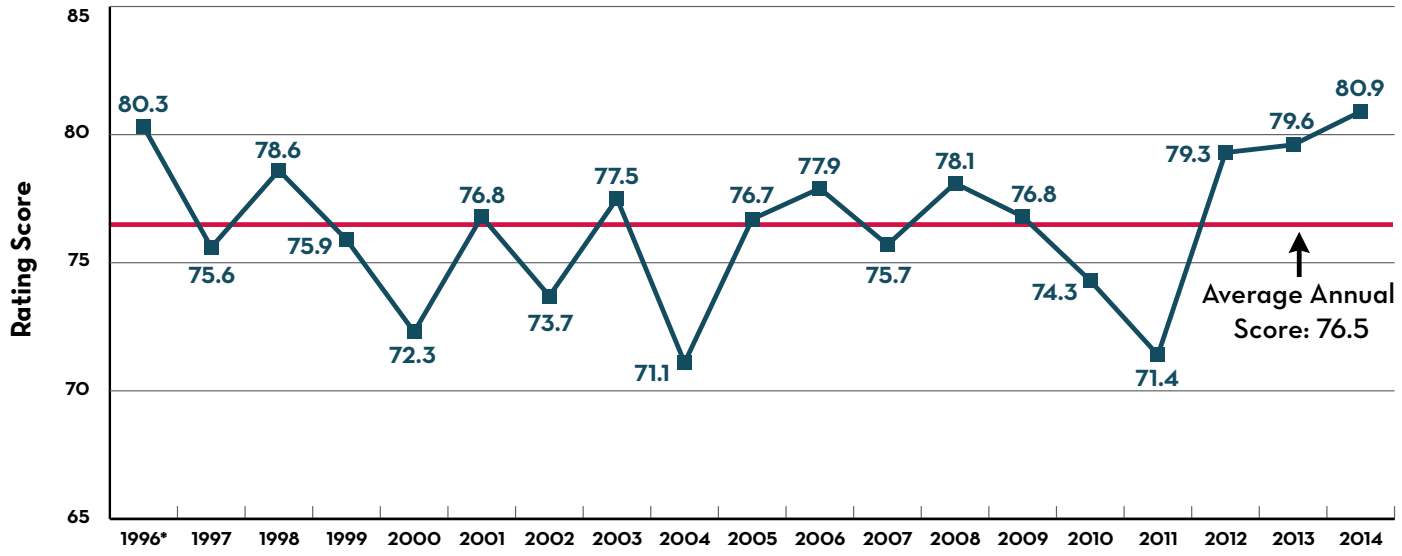
Since 1996, Saint Louis Science Center staff have been actively distributing comment cards to a random sampling of visitors each day, with the invitation, "let us know how your visit goes today". In 2014, visitors completed 1,278 comment cards.

In addition to providing space for comments about their experience, visitors rate their visit from "below expectations" to "above expectations" using a four-point rating scale. The ratings are converted to a score, which is an average of the ratings, where a rating of '4' is 100 points, a rating of '3' is 67 points, and ratings of '2' or '1' are both 0 points. In 2014, 92% of the comment cards had a rating of '3' or '4'.

Over the years, scores for individual months have ranged from a low of 62.9 to a high of 88.7. In 2014, monthly scores ranged from 74.3 to 87.8 and were above or well above average in almost every month, indicating visitors had a high level of satisfaction with their visits.

As the graph below illustrates, annual scores, which represent the combination of all the individual ratings received throughout the year, have ranged from a low of 71.1 to a high of 80.9. The average annual score for 1996-2013 is 76.5. In 2014, the overall visitor satisfaction score continued its recent upward trend and reached a new high of 80.9.

Saint Louis Science Center
Annual Visitor Satisfaction Rating Scores
1996*–2014
(*historical data begins March 1996)



Visitors' comments are coded into 23 different categories based on the topic addressed. The comments are also identified as either a "Positive/General" comment, which expresses either satisfaction or no problem, or an "Opportunity for Improvement", which expresses either dissatisfaction or offers a suggestion.

Of the 1,278 cards visitors completed in 2014, 83% included at least one comment. A total of 1,577 individual comments were collected from all the cards. A sample of comments is presented below.

Positive/General Comments:

OMNIMAX®:
"I was absolutely blown away by the theater, movie, the entire experience. How wonderful St. Louis has this!"

"We've been visiting for 23 yrs. We're never disappointed by the movies."

"Main reason for visit was to see *Jerusalem* at the Omnimax. We really enjoyed it."

"*Mysteries of the Unseen World* was beautiful!"

Planetarium:
"My 2 grandsons (& I!) thoroughly enjoyed the Planetarium show experience."

"Loved watching the "Live Sky" while laying on the floor."

Galleries and Programs:
"We come often, but always enjoy our visit because there is always something new to see/discover."

"This was our first visit. It was all amazing! Lots of hands on things to do. We stayed til closing and never got bored."

"Liked that adults could participate in the 'Lab'. We learned stuff!"

"The science show about electricity was awesome!"

"The Engineer Day was fantastic. Our 9 yr old is now excited to attend robotics camp this summer!"

Special Exhibitions:
"The *Dinosaurs in Motion* exhibit was awesome! Very informative and fun."

"We went to the *Sherlock Holmes* exhibit. It was a great date experience!"

Staff:
"Staff from snack bar, to ticket takers, exhibit staff, "ALL" are friendly and assist with questions and make sure that the customer is happy & smiles!"

General:
"So many delightful and intriguing items, you can spend the whole day, have fun, and learn."

"Thank you. Our boys love every visit! When ask what their favorite part was they said, 'The whole thing!'"

"I was amazed at how much there was to see and do! I also loved that it was free! My daughter wanted to go back the next day."

Opportunities for Improvement:

Gallery Content:
"More hands-on features in the space exhibits."

"Would be nice to see some new exhibits."

Parking:
"For people like me – not handicapped but some difficulty walking – the walk from the parking lot is very far. Suggest a back or side door entrance."

"It would be really nice if there was a prepaid exit booth when you left."

"The cost of parking is rather steep."

OMNIMAX®:
"Why not have more variety of OMNIMAX movies? That just gives us more reasons to go."

"The price of the OMNIMAX ticket seemed high in comparison to the length of the movie."

Planetarium:
"The seating for the star show was not comfortable for leaning back to see the ceiling. Reclining type seats like in the OMNIMAX theater would be much better."

Addressing visitor suggestions:

In 2015 and beyond, planned improvements include:

- Ongoing exhibit updates including a new Makerspace area, a new exhibit about the Mars rovers, and a new outdoor agriculture exhibition.
- A new main entrance on the south side of the building – much closer to parking.
- Conversion to digital projection technology for the OMNIMAX® Theater and James S. McDonnell Planetarium and improved seating options in the Planetarium.

How do visitors talk about the Science Center?

In 2014, as part of the seasonal exit interviews, visitors were asked, "What are five words that come to mind when you think about the Science Center"?

474

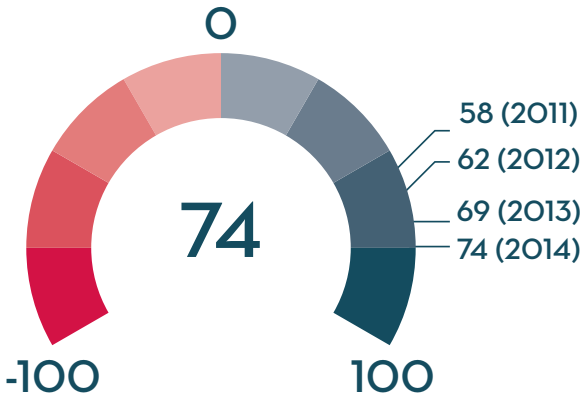
Number of unique words visitors associated with the Science Center.

Visitors mentioned 474 unique words that they associate with the Science Center. Even with similar words, such as "educational" and "learning", grouped together, there were still 317 different terms visitors mentioned. The two most common terms, "fun" and "educational", were each mentioned by over half the respondents. The word cloud above illustrates the relative frequency with which the terms were mentioned.

This information helps us better understand how our visitors perceive the Science Center. Beyond the broad terms of "fun" and "educational", we can see that visitors are also thinking about the content of our offerings ("dinosaurs", "space", "science"), the types of experiences they have ("hands on", "exciting", "entertaining", "creative", "informative", "exploration"), and the people with whom they visit ("family", "kids").

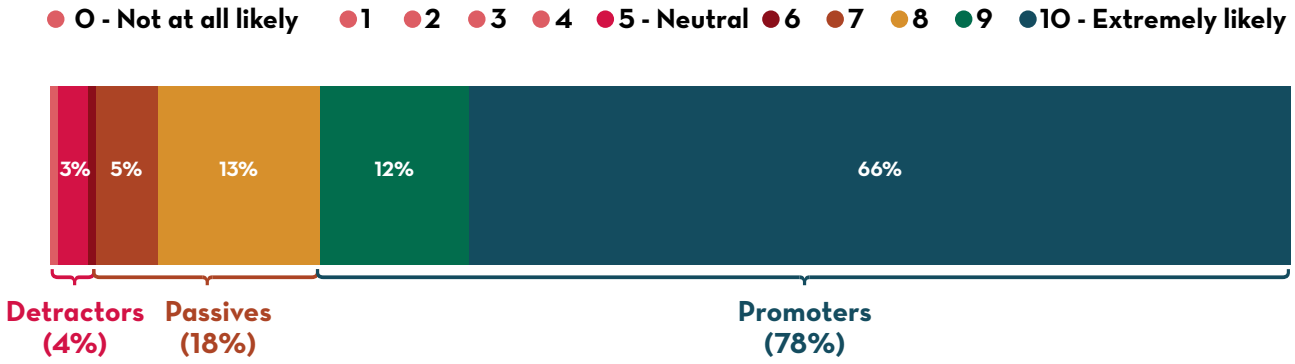
Visitors were also asked how likely they would be to recommend visiting the Science Center. This question, referred to as the Net Promoter Score (NPS®), is used in a variety of service industries as a measure of customer satisfaction. On a scale of 0 – "not at all likely to recommend" to 10 – "extremely likely to recommend", those who provide a rating of '9' or '10' are considered "promoters", those giving a rating of '7' or '8' are considered "passives", and those whose rating is '6' or lower are considered "detractors". The NPS is calculated by subtracting the percentage of respondents who are detractors from the percentage who are promoters. In 2014, the Science Center's NPS was 74, which is a strong score and an increase compared to recent years.

Net Promoter Score



2014 Net Promoter Score (NPS)

Likelihood to Recommend Visiting the Science Center



NPS = % Promoters - % Detractors = 74

How do we track engagement in Science Center programs?

At the Saint Louis Science Center, we define programs as, "staff-led interactions scheduled for a specific audience with written educational goals and objectives".

Since 1997, the Saint Louis Science Center has collected information about the experiences of participants in our programs. Our System for Assessing Mission Impact (SAMI) tracks the frequency with which programs occur, the number of participants, and the total hours of interaction.

What types of programs does the Science Center offer?

The Science Center offers programs to a wide range of audiences, including children, families, educators, school groups, and adults. In 2014, education staff delivered 63 programs a total of 5,312 times. These included seasonal programs such as *Summertime Science*, recurring programs such as *Preschool Science Series*, and daily programs such as *Live Planetarium Shows*. Of those 63 programs, 47 have been specifically designed for the K-12 audience, such as scout and school programs.

An "interaction" represents each time a visitor participated in a program. Interactions varied in length from less than five minutes at one of the outreach *Festivals* to a five-day *Summer Science Blast* summer camp. In 2014, 188,078 program interactions took place for a total of 163,688 hours of engagement. We track programs based on the audiences they serve. Some programs serve more than one audience, such as *Amazing Science Demonstrations*, which has versions designed for the General Public, K-12, and Adult audiences.

14.6

Average number of programs delivered by Science Center educators every day.

Total Interactions by Audience Served		
	Number of Interactions	% of total
Overall	188,078	100%
General Public	109,133	58%
Families	2,433	1%
Early Childhood	48,653	26%
K-12	27,381	15%
Adults (including educators)	478	<1%

Who participates in programs?

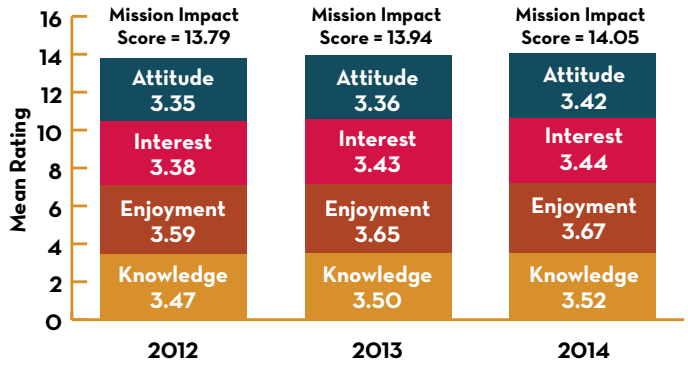
During many programs, participants had the opportunity to fill out a brief survey about their experience. In 2014, program participants completed a total of 7,279 survey cards. Through these surveys, we learn about their experience as well as gather basic demographic information. Child participants ages 17 and under filled out 53% of the survey cards. Adults ages 18 and up completed 33% of the surveys. Another 14% did not provide age data.

What is the immediate impact of programs?

Saint Louis Science Center's Definition of "Impact":
On an individual level, impact results from a Science Center offering that enables a participant to make personal connections between the content and experience of the offering and their own knowledge and experiences. In the short-term, this is illustrated by a change in knowledge/understanding, attitude, interest, or enjoyment.

Along with tracking basic program data, SAMI gathers data about the experience of Science Center program participants. The survey cards that program participants complete include four questions that assess knowledge gained, enjoyment, interest in science, and attitude towards science. The Knowledge, Enjoyment, Interest, and Attitude ratings, each of which is on a four-point scale, are summed to produce the Impact Score. The Impact Score provides a numerical way to represent the impact that participation in a program has on a individual. The lowest possible Impact Score is four and the highest is 16. Staff monitor how scores for one program relate to other programs delivered to the same audiences.

SAMI Impact Score and Mean Ratings - 2012–2014



In 2014, Impact Scores for individual programs ranged from 11.39 to 15.86 out of 16.00, with 93% of programs that collected data having Impact Scores of at least 13.00, indicating a relatively high level of impact, overall. Collectively, Science Center programs had a 2014 year-end Impact Score of 14.05. This is higher than the year-end Impact Scores for both 2012 and 2013.

The survey cards also provide space for participants' comments about their experiences in their program. When comparing participant comments from programs, we notice how each unique program reaches participants in different ways, thus showing if the program is meeting its experience goals. For example, comments about *Discovery Room* experiences revolve around enjoying exhibits such as the water table and recognizing the opportunities for open exploration, socialization, and development of life skills. Comments about the *Live Planetarium Shows* focus on specific content knowledge, such as stars and constellations, with adults more likely to mention learning how to identify space objects and children more likely to mention planets specifically.

The word cloud shown here highlights the terms used most often in comments about the *Live Planetarium Shows*.

Front-End Evaluation

How does front-end evaluation inform the development of new exhibits and programs?

Front-end evaluation is the initial research into what visitors know, are interested in, and have questions about for a certain topic. It can involve online surveys, interviews, and/or focus groups with particular audiences. In the early stages of exhibit and program development, front-end evaluation provides key information used to shape an exhibition's or program's design, experience, and content.

In 2014, the Saint Louis Science Center began working on a new project, *Bridging Earth and Mars (BEAM): Engineering Robots to Explore the Red Planet*. Funded through a grant from NASA, the objective of BEAM is to engage visitors in NASA's Mars missions through an interactive exhibit about Mars, Mars exploration, engineering, and robotics. The exhibit, which will have a presence in both the Science Center's main building and its James S. McDonnell Planetarium building, will feature programmable and direct drive rovers operating on simulated Martian landscapes. Supplemental educational programming for elementary and middle school students will also be developed.

The Science Center's Research & Evaluation department conducted the exhibit front-end evaluation, which involved in-depth interviews with 20 Science Center visitors – 10 adults and 10 children. The complete report is available online at *http://informalscience.org/images/evaluation/2015-02-23_BridgingEarthAndMarsExhibitFrontEndReport.pdf*. Carey Tisdal of Tisdal Consulting conducted the program front-end evaluation, in which 21 children, age 6 to 14, from predominantly underserved communities participated in focus groups at two community locations. The full report is available online at *http://informalscience.org/images/evaluation/2015-02-24_BridgingEarthAndMarsProgramFrontEndReport.pdf*. Several of the key findings from these studies and their implications for both the exhibit and educational programs are presented here.

The material contained in this summary is based upon work supported by NASA under grant award NNX14AD08G. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Aeronautics and Space Administration (NASA). Photographs courtesy of NASA.

Familiarity with Mars

Finding
Respondents demonstrated mixed levels of knowledge about Mars related to topics such as its climate, atmosphere, temperature, and terrain; Mars' location in the solar system; and the time delay involved in the transmission of information between Earth and Mars.

Implication
Many people have at least a basic understanding of Mars; however, in developing the exhibit and program content, these topics should still be addressed to provide a foundation of knowledge for all visitors.

Rover Content

Finding
The majority of respondents were aware that we have sent rovers (or robots/probes) to Mars, but were less aware of specifics about the rovers.

Implication
It will be important to explain what the rovers are, what they are made of, how they are powered, what they look like, and what they do on Mars.

Science on Mars

Finding
Half of the respondents stated that the rovers have a camera and/or take pictures on Mars; however, there was little mention that the rovers have other instruments or that they perform scientific experiments on Mars.

Implication
The Martian landscapes with programmable and direct drive rovers will allow visitors to experience using a variety of scientific instruments as well as the process of transmitting data between Mars and Earth.

Diversity

Finding
Children in the focus groups did not recognize that men and women of different ethnicities and backgrounds work at NASA or on the rover projects.

Implication
In delivering programs, it will be important to incorporate men and women from a range of ethnicities into workshops, videos, and presentations to show children that "people like them" can have successful careers in STEM.

Importance of Exploration

Finding
Though some mentioned the potential habitation of Mars, most respondents did not articulate why exploring Mars could be of use to society.

Implication
In both the exhibit and in programs, the importance and benefits of Mars exploration should be presented in a way that makes it relevant to visitors' lives.

Engineering Design Process

Finding
Children in the focus groups tended to skip key steps in the engineering design process, such as "identifying the problem" and "identifying constraints".

Implication
In developing and implementing programs, it may be necessary to scaffold concepts to provide logical steps participants can follow to complete their tasks.

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