

DUNK! The Science of Basketball:

A preliminary assessment

Appleseed
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Science and Arts Engagement New York, Inc. (“SAENY”) is a New York City-based 501(c)3 not-for-profit organization. Inspired by the Science Gallery model first developed at Trinity College in Dublin, SAENY is seeking to engage young New Yorkers in the fields of science, technology, engineering, arts and mathematics (STEAM) through a series of exhibitions and programs that demonstrate how STEAM can help young people understand, and more effectively interact with, the world around them.

From March 16 through April 14 2018, SAENY piloted this concept with a pop-up installation called *DUNK! The Science of Basketball*, which was installed in space donated by Janus Property Group on West 126th Street in West Harlem’s Manhattanville Factory District. *DUNK!* included five exhibits dealing with topics such as variations in the height of basketball players; hand size and the ability to palm a basketball; and measuring players’ vertical leap and “hang time.” It also included a ten-minute video with segments on the NBA dunk contest and the science of foul shooting. Dunk! was a collaborative effort with City College of New York and was supported by the West Harlem Development Corporation, the NYC Council’s Digital Inclusion Initiative led by Council Member Daniel Dromm, Capalino+Company, as well as several private donors. The Social Responsibility Unit of NBACares arranged for the donated use of photos and video clips.

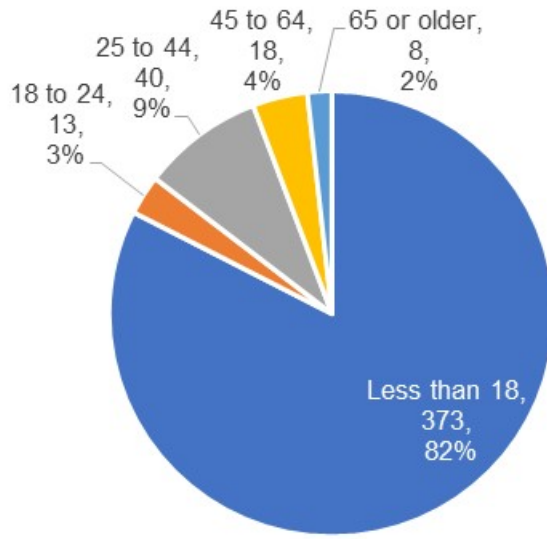
DUNK! was open five days a week, from noon to 5:00 PM on Tuesdays, Wednesdays, Thursdays and Fridays, and from 11:00 AM to 5:00 PM on Saturdays. Visitors were guided through the exhibits by “mediators,” City College of New York students who were specially trained for this role and were provided stipends by City College. For school groups, mediators also led discussions at the end of each tour.

Attendance at DUNK! totaled 618 individuals, including 496 who came with school groups and 122 walk-ins. A brief survey questionnaire was provided to all visitors to the exhibition. After touring the exhibits, 457 visitors completed the survey, in whole or in part, resulting in a very robust 74 percent response rate. Below we summarize our key findings from this survey.

Age

As shown below in Figure 1, more than 82 percent of all those who responded to the DUNK! survey were less than 18 years old. Nearly 3 percent were age 18 to 24; nearly 9 percent were 25 to 44; 4 percent were 45 to 64; and nearly 2 percent were 65 or older.

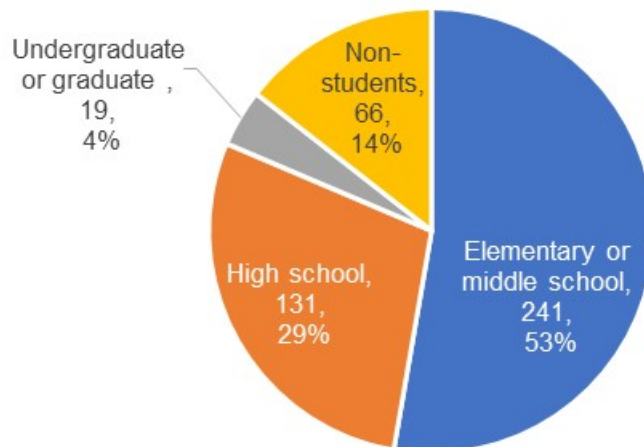
Figure 1: Age distribution of visitors



Educational status

Consistent with the age distribution cited above, 241 visitors (nearly 53 percent of all respondents) identified themselves as elementary or middle school students, and 131 (nearly 29 percent) as high school students (Figure 2). Another 19 (slightly more than 4 percent) were undergraduate or graduate students. Non-student participants included teachers and parents accompanying school groups, as well as adult walk-in visitors.

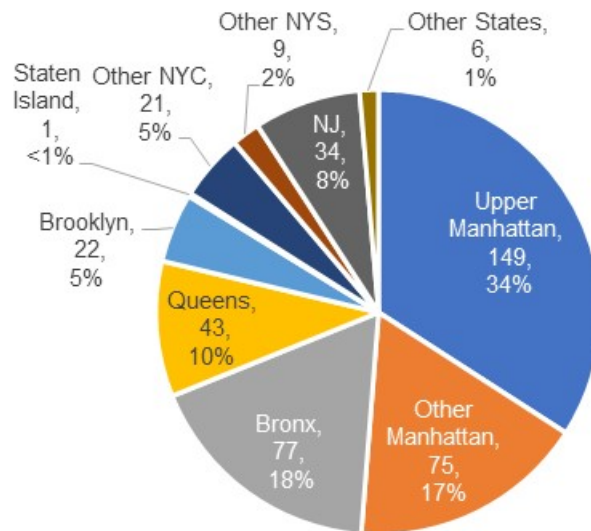
Figure 2: Distribution of visitors by student level



Where they came from

Respondents to the DUNK! survey came from all of New York City's five boroughs (Manhattan, the Bronx, Queens, Brooklyn and Staten Island) and from other communities in the New York-New Jersey region. Given the location of the exhibition it is not surprising that the largest number of respondents (as shown in Figure 3) were residents of Upper Manhattan –149, or 34 percent of the total. Another 17 percent came from elsewhere in Manhattan, and 18 percent from the Bronx.

Figure 3: Distribution of visitors by place of residence



While the survey did not collect information about household incomes, we note that more than half of all respondents who provided a place of residence were from either Upper Manhattan or the Bronx – areas that continue to confront some of New York City's most difficult economic and social challenges. In Upper Manhattan, for example, the poverty rate among children under 18 was more than 38 percent; in the South and Central Bronx, it was more than 48 percent.

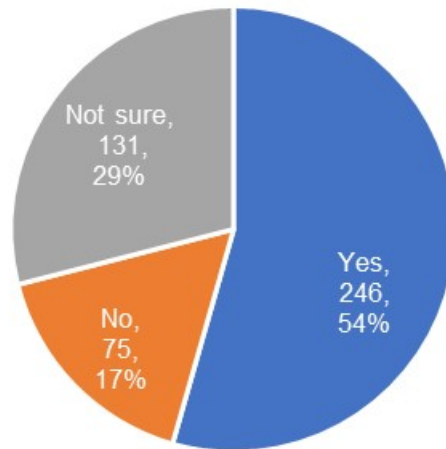
How they learned about DUNK!

As noted above, 80 percent of all DUNK! visitors came with school groups. Walk-ins cited a number of ways they learned about the exhibition, including television coverage, social media, personal contacts and other sources. DUNK! drew the attention of local NYC news media including a 2.5-minute segment on NY NEWS1 and a 1.5-minute segment on Fox News, as well as posts on Twitter and Instagram.

Interest in learning more

Visitors to the exhibition were asked whether seeing DUNK! had “increased your interest in learning more about the science, technology, engineering, art and mathematics behind other sports, and other aspects of everyday life.” As shown below in Figure 4, 54.4 percent said yes, 16.6 percent said no, and 29.0 percent said they weren’t sure.

Figure 4: “Has DUNK! increased your interest in learning more about the science, technology, art and mathematics behind other sports, and other aspects of everyday life?”



On a related question, students were asked whether “seeing DUNK! has increased your interest in studying science technology, engineering or mathematics in school.” As shown in Figure 5, 46.1 percent said yes, 20.5 said no, and 33.4 percent said they weren’t sure.

Responses to this question, however, varied significantly by grade level. As shown in Table 1, those who answered in the affirmative included:

- 37.5 percent of all elementary and middle school students;
- 56.5 percent of all high school students; and
- 86.7 percent of all college undergraduates.

Figure 5: “If you are a student, has seeing DUNK! increased your interest in studying science, technology, engineering or mathematics in school?”

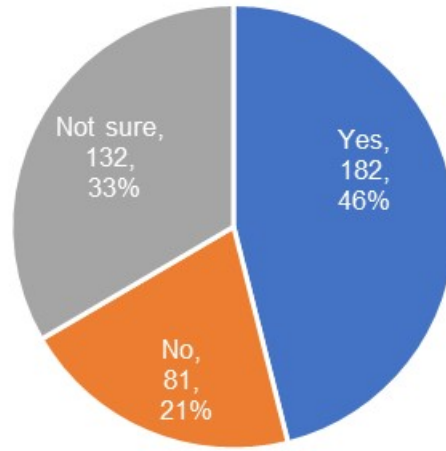


Table 1: DUNK!’s impact on students’ interest in studying STEM subjects, by school level

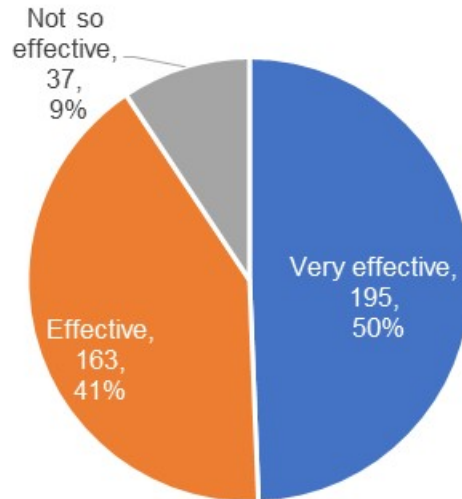
	Elementary/ middle school	High school	Undergraduate	Graduate	Total
Yes	83	70	13	4	170
Not sure	92	33	–	–	125
No	46	21	2	1	70
Total	221	124	15	5	365¹

Effectiveness of mediators

Visitors were also asked to rate the effectiveness of the City College student mediators “in explaining the exhibits and answering questions.” As shown in Figure 6, 49.4 percent of all respondents rated the mediators as being “very effective,” 41.3 percent rated them “effective,” and only 9.4 rated them “Not so effective.”

Figure 6: Visitors’ ratings of the effectiveness of mediators

¹ The total number in Table 1 (365) is smaller than the total number shown in Figure 5 because some of the students who are included in Figure 5 did not provide information about their current school level.



Comments from respondents

Visitors to the exhibition were also invited to provide brief written comments. Several themes come through in these comments

More exhibits

Perhaps the most frequent comments – from students, teachers and others – dealt with the need for more exhibits than the five that DUNK! included. (It should be noted that SAENY was constrained in what it could include in its first pop-up exhibition by the limited availability of suitable space, and the limited time and resources available for preparation of the exhibition.)

It would be better if the exhibit were bigger (high school student)

I wish there was more to see (high school student)

Should add some more stuff (high school student)

Have a larger exhibit with additional demos and activities (teacher)

It was difficult to occupy students for the suggested full hour (teacher)

Add a bit more to the exhibits (middle school student)

More interactive

Many of those who provided comments suggested that the most interactive of the exhibits (on jumping and hang time) was also the most effective, and future exhibitions should be more interactive.

Let's make it more interactive – real balls to bounce, different surfaces on which to bounce, baskets, more technology, etc. (parent)

Just needs to be more interactive (parent)

I really like to see how high I can jump (middle school student)

They should add a section where you can shoot (middle school student)

It would be more interesting if you taught us about the physics of shooting (middle school student)

Overall reactions

Overall, most (but not all) of those who commented had a positive view of the exhibition.

It was cool. I'd be excited to see the exhibit expand in size (middle school student)

Great way to interest kids in math and physics (parent)

We should have more of these exhibits to integrate sports and science (adult visitor)

This is the best exhibit I have ever seen – 5 stars (middle school student)

It was boring (middle school student)

Teaching materials

In addition to guided tours of the exhibits, SAENY provided teaching materials on a series of related topics, such as:

- How high could you jump, and what would be your hang time, on other bodies in the solar system?
- Statistics on how the heights of NBA players compare to the heights of the general population, highlighting just how rare seven-footers are
- How the dimensions and design of NBA courts differ from those of college courts, and how these differences shape the game

Some teachers used these materials to work with students at the exhibition site, after they had completed their tour of DUNK! Teachers could also download selected materials at SAENY's website, for use in class. These materials provide an opportunity for teachers to help students deepen what they learned from the exhibits, and to relate the exhibits to what they are learning in class.

Feedback from mediators

City College student mediators played a key role in presenting DUNK! and interacting with visitors. They shared their experiences and perspectives during two roundtable discussions held in May 2018. The following are some highlights of those discussions.

Interactivity

Among visiting students, the mediators agreed that the hang time exhibit was by far the most popular. Like some of the survey respondents cited above, some mediators suggested that other exhibits might have been insufficiently interactive and too information-heavy – although they noted that some of the information provided in those exhibits helped prepare visitors for their exploration of hang time.

Space needs

Several mediators noted that at peak attendance times, there was often insufficient space around and between the exhibits to accommodate all of the groups present – a point that was also noted in comments provided by several teachers. Mediators also suggested that more space should be dedicated to post-tour activities – for example, tables and chairs (or just open space) where students could work on various worksheets relating to the exhibits; engage in-group discussions; or provide feedback on the exhibition.

Reflections on their role as mediators

The mediators generally felt comfortable leading groups through DUNK! Some said they could have used more up-front training – although they also recognized the time constraints affecting this first pop-up exhibition. Many said that beyond their basic training, they spent time researching the topics covered in the exhibits, so that they could more effectively convey information to visitors and answer their questions. They also looked for relevant “fun facts” that they could weave into their presentations.

Many mediators said they really enjoyed their role as educators; and enjoyed learning how scientific knowledge can be conveyed in more relatable, more understandable ways. Some said their experience with DUNK! helped them appreciate the importance of their academic work, and how science affects and can help enrich the lives of people outside “the academic bubble.”

Looking to the future

Asked whether they would consider working again as mediators, most said yes, if their academic schedule would allow them to do so. Several mediators also suggested topics for future exhibitions, including baseball, music and “survival.”

Implications for future exhibitions, and beyond

SAENY’s first pop-up exhibition was in many respects a notable success. It was mounted quickly, and despite very limited resources for marketing and outreach, it drew 618 visitors in four weeks and was covered on local television news programs.

Moreover, the fact that school groups accounted for most of its attendance (with more than 82 percent of all those who visited Dunk! being less than 18 years old) suggests that the exhibition was successful in reaching its intended audience – primarily young students from low-income minority communities, especially in Upper Manhattan and the Bronx.

While survey respondents and mediators cited a variety of problems, some of the exhibition's limitations appear to have been primarily a product of the constraints on space, time and resources with which SAENY had to cope. Many of the concerns expressed by visitors and mediators alike – the need for more than five exhibits, insufficient interactivity, and lack of space for post-tour activities will be addressed by SAENY in its planning for future exhibitions.

As shown above in Table 1, a majority of high school and college students surveyed said that seeing DUNK! had increased their interest in studying STEAM subjects. Only 37.5 percent of elementary and middle school students, in contrast, answered this question affirmatively. While it seems entirely natural that younger students would be less ready to draw a clear connection between their experience with DUNK! and fields they would like to study in the future, engaging students before they reach high school is nevertheless important. For future exhibitions – in particular, with the room and resources needed to create more exhibits, SAENY could consider including some that are specifically designed to engage younger students. Similarly, teaching materials associated with individual exhibits could vary by school level.

We note also that in the long run the effectiveness of SAENY's program will depend in part on its success in extending and deepening the impact of its exhibits through the use of online and social media. SAENY is still in the early stages of developing its "virtual community" of aspiring young scientists, engineers, artists and mathematicians – but its work to date has provided a necessary foundation for that effort.

About Appleseed

Appleseed is a New York City-based consulting firm, founded in 1993, that provides economic and social research and local economic development planning services to government, institutional, non-profit and corporate clients. Since its founding, the firm has conducted program and project evaluations for a wide range of clients, including the Empire State Development Corporation, the Lower Manhattan Development Corporation, the New York City Mayor's Office, Columbia University, the Johns Hopkins University and Health System, New York University, the Clinton School of Public Service (University of Arkansas), the United Way of New York City, the United Way of Tri-State, the Central Park Conservancy and Madison Square Garden.

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