NBA Math Hoops

Findings from the Philadelphia Area

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September 2020
# NBA Math Hoops: Findings from the Philadelphia Area

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Study Overview

Learn Fresh, the nonprofit that runs the NBA Math Hoops program, selected WestEd to research the progress of its Philadelphia-area clubs.¹ Philadelphia is one of the cities where NBA Math Hoops is the most robust, and Learn Fresh was interested in learning about the successes of the clubs in the Philadelphia area, NBA Math Hoops’ impact on students and their coaches, and ideas for future program improvements.

To learn about the Philadelphia-area clubs, WestEd attended an NBA Math Hoops tournament in Philadelphia that drew more than 200 students, interviewed 16 NBA Math Hoops coaches, and talked to a small number of parents about their children’s experiences. Through these observations and conversations, WestEd gathered an overwhelming amount of positive feedback about the program, as well as suggestions for how to make it even more accessible and appealing.

Research Questions

The three research questions that guided this evaluation address the program’s support for students, support for educators, and implementation features:

- Does NBA Math Hoops support students’ mathematical and social-emotional development?
- Does NBA Math Hoops effectively help coaches develop student math skills and feel good about teaching?
- How is the program being implemented, what is working well, and what could be improved?

Description of the Intervention and Study

NBA Math Hoops, a program that includes a board game, accompanying curriculum, and mobile application, is designed to improve mathematics proficiency in 4th - 8th grade students. The game provides students opportunities to practice mathematical operations, explore probability, and improve fluency. The collaborative nature of the game, as well as the curriculum, also encourage students to work productively with each other, demonstrate good sportsmanship, and persevere.

Research has demonstrated that constructive out-of-school time activities can support positive youth development, and can support both academic and social-emotional skills.² There is also suggestive evidence that hands-on, engaging math instructional techniques boost student learning—particularly

¹ The Philadelphia tournament drew participants from clubs based in Pennsylvania, Delaware, New Jersey, and Virginia.
during the school day, but also afterschool.\(^3\),\(^4\) In the Philadelphia area, Math Hoops clubs were run both during the school day and in afterschool contexts, and coaches repeatedly indicated that the game and curriculum are very engaging for students.

Learn Fresh and WestEd partnered to understand how these features of the game manifested in the students and coaches who participated. WestEd researchers attended the Philadelphia tournament in February 2020. The research team observed games while speaking with students, coaches, and parents. The research team then created an interview protocol and conducted interviews with coaches who had brought teams to compete in the tournament. These coaches, who were teachers, tutors, and afterschool providers, offered insights into their experiences with the game.

WestEd then reached out to parents who had requested copies of NBA Math Hoops to play at home during the COVID-19 pandemic. Perhaps due to the pandemic, parent response rates were low, and the research team was only able to speak with two parents about their children’s experience with the game. Due to the low sample size, this information not included in this report. However, both parents reported satisfaction with the game, on behalf of themselves and their children.

**Participants**

This study includes data from 26 NBA Math Hoops clubs from four states in the Philadelphia area. As shown in Figure 1, most of the clubs who participated in the February tournament are located in Pennsylvania (13) and New Jersey (10), with representation from Delaware (2) and Virginia (1). Roughly two-thirds of these clubs met during the school day (65\%), and about one-third (35\%) met after school.

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\(^3\) https://www.niost.org/pdf/AOLTW.pdf  
The study team interviewed 16 coaches across the region to learn about their experiences leading clubs. Most of the interviews were with coaches in the two states with the largest numbers of clubs, New Jersey and Pennsylvania, but at least one coach was interviewed from each state. As shown in Figure 2, eight of the interviewed coaches were from New Jersey, five were from Pennsylvania, two were from Delaware, and one was from Virginia. Thus, in relation to state participation, the interview data somewhat overrepresent the perspectives of New Jersey coaches and somewhat underrepresent the perspectives of Pennsylvania coaches.

Beyond state representation, the proportion of interviewed coaches leading in-school clubs (69%) and afterschool clubs (31%) very closely matches the proportions for the tournament. These 11 in-school clubs were led by classroom teachers, whereas the five out-of-school-time clubs were led by afterschool providers, such as volunteers, YMCA staff, and tutors. Finally, as shown in Figure 3, the majority of coaches interviewed (13 of 16) did not participate in the Community League. These characteristics should be taken into account when interpreting findings.

The Community League is a group of clubs in Philadelphia that had opportunities to play NBA Math Hoops against one another prior to the larger tournament. The three coaches who were interviewed from these clubs reported satisfaction with their experience as League members.
Supporting Students

The evaluation examined how Math Hoops is helping its primary audience: the students who participate in the program. Specifically, the review sought to answer the following questions:

- Does Math Hoops support students’ engagement and interest in math?
- Does Math Hoops help coaches support students’ mathematical understanding and performance?
- Does Math Hoops support students in other ways, such as social-emotional and non-cognitive skills?

“I did feel like some of my students who tend to struggle with math definitely were successful at Math Hoops, so it definitely was approachable from many different levels of where a student’s ability might be. It allowed everybody to stay engaged.

— NBA Math Hoops coach

Does Math Hoops support students’ engagement and interest in math?

Math Hoops helped deepen some students’ interest in math, but this did not extend to all students.

Students almost universally enjoyed playing the game. Coach statements included such glowing recommendations as, “If I could have played with them every day, they would have been in heaven.” Coaches identified the reasons for this engagement as the opportunity to play a game, chances to compete against other students, and the connection to the NBA and its players.
Outside of gameplay, teacher-coaches (i.e., those who coached NBA Math Hoops and also work as classroom teachers, as opposed to afterschool providers) reported that playing Math Hoops carried over into higher math engagement for a portion of their students. Some of these students were predisposed to increased math engagement, based on pre-existing higher math achievement. However, this was not true of every student whose math engagement grew, and teachers provided a few anecdotes about students whose interest in math shot up because of Math Hoops, as in the quote below.

“One boy kind of struggled in my class. School wasn’t his thing, but he likes gym class. When I said that we were playing an NBA math game, he kind of lit up and was excited about it. I posted all the tutorials on Schoology. He watched all the videos that night... He wasn’t one of the higher [performing] students in my class, but I think it made him more excited about learning and more engaged... His math scores did grow this year. He ended up saying that math was his favorite subject, whereas I don’t think it was at the beginning of the year. I think that really motivated him and touched him.”

— NBA Math Hoops coach

Although the overall impact on engagement was positive, four coaches mentioned how the engagement had been limited or only affected certain students. Two of these coaches were also classroom teachers, and they said their students were highly engaged in playing Math Hoops but that their broader engagement with math did not change. The other two coaches who reported limited effects on engagement are in the afterschool setting. Both of these afterschool coaches described how the fact that the activity had a math focus narrowed the number of students who were willing to play.
Does Math Hoops help coaches support students’ mathematical understanding and performance?

Math Hoops’ support of math fluency can allow teachers to focus on other math skills.

Many coaches identified improvements in math fluency as a key benefit of the program. Increased fluency has the effect of allowing them to focus on other skills and techniques in their instruction. One teacher-coach mentioned that, given her curriculum’s focus on mathematical processes, it can be a nice change of pace to focus on fluency. Math Hoops’ focus on fluency may also help introduce and prepare students for math skills that they have yet to learn or master, as observed by one coach in the quote below:

“In addition to the math facts, they also had to learn to read graphs, right from the get-go, and they had to do percentages too. They had to know with the accuracy – with three digits, round to two. So, even though we hadn’t done data analysis, that’s usually May or June, they learned it through this game.”

— NBA Math Hoops coach

Math Hoops gives teachers an alternative approach to teaching math.

Teacher-coaches appreciated the impact that Math Hoops had on their overall instruction. For some teacher-coaches, this was as simple as introducing some novelty into their classroom activities. For other teacher-coaches, this impact included giving them ideas for their own instruction. One teacher-coach said that he now tries to incorporate more games instead of direct instruction. Another teacher said that Math Hoops gave him a new perspective on his lesson organization.

Due to the positive effect on engagement mentioned elsewhere in the report, Math Hoops helped teacher-coaches widen the reach of their math instruction to students who may been less receptive to other forms of instruction. In this way, Math Hoops has the potential to support teacher-coaches’ differentiation. As one teacher-coach noted:
“I did feel like some of my students who tend to struggle with math definitely were successful with Math Hoops, so it definitely was approachable from many different levels of where a student’s ability might be. It allowed everybody to stay engaged.”

— NBA Math Hoops coach

**Consistency is a key factor in producing positive outcomes.**

A theme across several coaches’ interviews was that coaches who implemented Math Hoops regularly and frequently saw greater impact, and coaches who used the game less consistently saw less of an impact. This is particularly relevant in afterschool settings, where student attendance can be unpredictable.

**Coaches generally believed that Math Hoops supports their students’ math understanding/performance.**

Coaches responded affirmatively when asked whether Math Hoops supported math understanding and performance. In particular, nearly all coaches identified math fluency as a skill that Math Hoops supports. Coaches liked how Math Hoops helped students perform calculations quickly.

Beyond math fluency, two coaches also spoke about data literacy and using statistics to solve problems. Individual coaches named additional skills that were bolstered by Math Hoops, citing percentages, pie charts, reading graphs, and division with remainders.

“They loved taking their stats. The best impact that I found ... In our drafting day, they got to see that the main person who they thought was awesome—guess what, there might be a girl [WNBA player] who could [outperform] him. So, they really got to use the math abilities to pick a team and apply this.”

— NBA Math Hoops coach
Does Math Hoops support students in other ways, such as social-emotional and non-cognitive skills?

Math Hoops helped students develop social-emotional and non-cognitive skills: most commonly mentioned were sportsmanship, teamwork, and confidence.

Math Hoops’ curriculum offers lessons on such competencies as teamwork and leadership, designed so that students can improve their social-emotional and non-cognitive skills as they improve their mathematical fluency. When asked about the impact of the curriculum and gameplay on these traits, coaches overwhelmingly reported that they had noticed these skills had developed through participation in Math Hoops. The most common skills cited were sportsmanship, teamwork, and confidence—coaches noted that, while some of their students entered the club with poor sportsmanship, they observed marked improvement over time. They also said that, as students gained fluency, they became more confident in their abilities to do math and participate in the game. The tournament was seen as an important confidence-booster for many students.

Coaches also noted increased responsibility, heightened perseverance, and improved social skills.

Students developed teamwork skills through the curriculum and playing the game itself. Many clubs gave students the same partners from week-to-week, and coaches noted that students responded positively to the challenge of having another student count on them. One coach noted that students were asked to train new students as they entered the club, and students eagerly took to the responsibility.

Individual coaches mentioned a few other positive effects in one or more students that they attributed to the game: a heightened ability to befriend peers, increased perseverance, and the language to encourage peers to behave with good sportsmanship.

“At first, it was for points, they wanted sportsmanship points. But then it just became natural for them – ‘you can do this!’ ‘great game!’ – just things to encourage each other. High fiving each other. It became part of our classroom culture. I reached out to the governor, and he came to our class, and the news came and videotaped them. That had an impact on them.”

— NBA Math Hoops coach
Supporting Educators

WestEd’s evaluation gathered insights from teachers and staff who implement Math Hoops at various schools and afterschool programs. Specifically, the review sought to answer the following questions:

- Does Math Hoops help coaches increase students’ engagement and interest in math?
- Does Math Hoops give coaches new ideas for teaching and learning math?
- Does Math Hoops impact coaches’ interest and engagement in their own work?
- Did coaches have the right supports to implement the program?

“It’s tough today; we’re being replaced by technology, and I love the fact that it’s hands-on, their face isn’t in front of a screen. I love that they have to work on teamwork, they’re touching things, an actual board game as opposed to a technology site.”

— NBA Math Hoops coach
Does Math Hoops help educators increase students’ engagement and interest in math?

Math Hoops helped create a positive classroom climate around math.

As a result of Math Hoops’ positive engagement on individual students, five teacher-coaches reported that it had a positive impact on the general attitude of their class around math. For instance, one teacher-coach said that her class had become “the fun class,” and she identified Math Hoops as a key driver of this reputation. She also reported that students would remind her when it was time to play Math Hoops. Another teacher-coach said that Math Hoops let her “be more of a cheerleader” and to take on a more positive role—a role distinct from her regular responsibility of being an academic instructor and rule enforcer.

Afterschool educators had a harder time maintaining engagement.

Educators in the afterschool setting reported more modest levels of engagement. They also shared more stories of students becoming disengaged. These educators still found the program very effective, but it may be worth noting that, in these Philadelphia-area coaches’ experience, engagement differs based on setting. One afterschool educator said that she had noticed lower engagement for students who are not regularly in attendance at her club, and as a result are unable to play consistently. This allows some students to become skilled at the game and the underlying math skills, which creates an advantage over students who play infrequently. The afterschool setting also has to contend with the appeal of other activities, since students may have the option to pick from among several options. Finally, students may be more fatigued at the end of the school day. One afterschool educator said she sometimes had a hard time convincing her students to do math after a full day of academic instruction.

Does Math Hoops give teachers new ideas for teaching and learning math?

Three quarters of the coaches WestEd interviewed said that Math Hoops had given them new ideas for teaching and learning math.

Teachers were more likely than other Math Hoops coaches to say that their involvement with the program had an impact on their ideas for teaching math. All but one of the teacher-coaches interviewed said they had gained new ideas from coaching Math Hoops, whereas the responses from other coaches were mixed. This may be due to the fact that Math Hoops is different from traditional classroom instruction but may have common elements with other out-of-school-time programs that focus on engagement and play.

Supporting that idea, when asked about new ideas for teaching math that emerged from the program, coaches’ most common response was that coaching Math Hoops led to coaches incorporating more games into instruction. They described teaching kids card games, having kids create their own games, and increasing opportunities for kids to compete against one another.
Math Hoops allowed teacher-coaches to approach math in a more fun, relaxed way, among other changes.

Several coaches also reported that, as a result of Math Hoops, they had grown more relaxed in the classroom and had built in more opportunities for kids to have fun. Two coaches noted that the game encouraged them to focus more closely on building operational fluency. Coaches also said that the game encouraged them to incorporate math flash cards into instruction, think differently about how to organize their lessons, and increase their focus on relating to students’ interests.

Does Math Hoops impact teachers’ interest and engagement in their own work?

Math Hoops did not necessarily impact teacher-coaches’ interest and engagement in their own work.

While coaches reported that they enjoyed leading NBA Math Hoops, teacher-coaches did not typically indicate that the club had an impact on their interest and engagement in other classroom or teaching duties. They did note that it was great to connect with children and their parents about something fun, and that it was really rewarding to see how excited their students were about NBA Math Hoops.

One coach who works at an afterschool program reported that her involvement with the program had helped her overcome math phobia and that she was looking forward to coaching more sessions in the future.

Did educators have the right supports to implement the program?

Coaches were pleased with support from Learn Fresh.

Coach feedback about program supports was overwhelmingly positive. Coaches consistently mentioned that the in-person training was helpful and engaging, that Learn Fresh staff provided prompt, helpful feedback, and that the online videos and resources were helpful.

Coaches also had ideas for how to improve program support.

While coaches were happy with the program supports, they also had ideas for how it could be even better. When asked how the program could be improved, some coaches’ suggestions touched on additional supports that Learn Fresh could provide them. These suggestions are detailed in the Program Implementation section.
“In addition to the math facts, they also had to learn to read graphs right from the get-go, and they had to do percentages, too. They had to know with accuracy – with three digits, round to two – so even though we hadn’t done data analysis, that’s usually May or June, they learned it through this game.”

— NBA Math Hoops coach
Program Implementation

WestEd’s evaluation sought to understand how Math Hoops has been used and to explore future changes. Specifically, the review sought to answer the following questions:

- Was the Math Hoops program implemented as it was designed? In what ways did it differ?
- How might Math Hoops be improved?

“To see them use that language, ‘you weren’t a good sport when you did this, that hurt my feelings,’ they could give evidence about what people did that wasn’t nice, and the next time they played, you could see those kids worked on it...it became part of our norms, classroom discussions, and expectations.”

— NBA Math Hoops coach

Was the Math Hoops program implemented as it was designed? In what ways did it differ?

Math Hoops was largely implemented as designed, with some additions to let coaches extend the learning.

Coaches largely implemented Math Hoops as it was designed. Some changes that coaches reported were actions taken in addition to the provided rules, not in lieu of them. For example, one coach created rules for earning sportsmanship points and had the students manage the process by awarding points to one another. She also had each pair of Math Hoops players make a team logo, and she created a bulletin board in the hallway to display the logos and their progress. Another coach said that she worked with her students to graph their scores over time, so that they could chart their progress.
Coaches who did change the rules adjusted them to give students more support. One coach said that for her group, comprised largely of students with disabilities, she introduced the game without the full set of rules. Over time, as the students grew more comfortable with the game, they added rules until they were played the game as designed. Another coach, located in an afterschool program, said she adjusted the drafting process because she did not have a consistent group of students each week. Instead of asking them to draft for a season, she let them draft players each week. She noted that she also gave them more time to read the cards and process the players’ statistics than the rules indicated, because students got frustrated when they were asked to choose quickly. A third coach reported teaching technical details of the game, such as steals and fouls, earlier in the year during her second year of leading the club. She said her students did not have a firm grasp of these rules at the prior year’s tournament, and she wanted to make sure the concepts were solidly explained in advance of the 2020 tournament.

One coach mentioned his students sometimes wrote down their answers and then quickly spun the wheel regardless of whether their answer was a good one, which prevented the other team from stealing. He changed the rules for his students to make sure they were giving their best answers, waiting before spinning, and giving the other team a chance to review their work and consider stealing.

**How might Math Hoops be improved?**

Coaches offered suggestions about Math Hoops’ online gameplay, future tournaments, curriculum and materials, and coach supports. The suggestions below were each provided by one coach unless otherwise stated.

**Online Gameplay**

One coach wondered whether the online version of Math Hoops could be modified to allow one-on-one games, rather than team games. While this would decrease students’ opportunities to engage in teamwork, it might also allow more students to play the game. Another suggested that Math Hoops create a portal of similar games for students to play from home.

**Future Tournaments**

Coaches reported that their students loved participating in the tournament, and two coaches wondered if Learn Fresh could open the tournament to more students. A few coaches also asked for more referees, noting that their students were frustrated when opponents were able to get away with cheating. In some cases, students were not cheating, but they were manipulating the rules by running the shot clock down, and referees may have been able to discourage that behavior. Another coach asked for support traveling to tournaments.

Coaches noted that kids in classroom-based clubs were often more prepared than those who played Math Hoops in an afterschool setting and were less likely to play as frequently. To address that issue,
one coach suggested two tournament brackets—one for afterschool clubs, and one for classroom-based clubs.

**Coach Supports**

In keeping with the observed difference between classroom and afterschool clubs, one coach also suggested creating a version of the game that was tailored to afterschool clubs. The coach suggested that it could be simpler and offer support on how to run a club for an ever-changing roster of students.

Another coach requested that Learn Fresh help connect coaches to other clubs in their areas, suggesting that the clubs could then hold smaller local tournaments and collaborate between seasons and tournaments. A coach in an afterschool club suggested that Learn Fresh provide additional incentives for teachers, such as t-shirts and NBA tickets, in order to reward coaches for their involvement.

One veteran coach noted that, while she was comfortable with the game, it would have been helpful to check in with Learn Fresh more frequently during her first year as a coach. Another coach suggested more advertising, noting that the club was a great experience and more teachers and adults could benefit from getting involved.

> “Teamwork and sportsmanship can carry you into anything in life, corporate America or behind a desk in a school building.”

— NBA Math Hoops coach
Highlights

Coach interviews, parent interviews, and observations of Math Hoops games revealed some program highlights.

“It was designed for the kids to support each other.”

— NBA Math Hoops coach

Each of the coaches with whom WestEd spoke had overwhelmingly positive feedback about the Math Hoops game, support from Learn Fresh, and participating in the Math Hoops tournament.

**NBA Math Hoops**

NBA Math Hoops was beloved by coaches, parents, and students alike. Coaches praised the curriculum, the confidence- and skill- building game, and the fact that the materials were both extremely high-quality and free. Coaches expressed a desire to continue coaching the game in the future and were eager to participate in more Math Hoops events.

**Learn Fresh**

Coaches were amazed by Learn Fresh’s responsiveness, the hands-on and engaging training, and the personalized attention. They felt that Learn Fresh was attentive to their needs and went above and beyond to eliminate barriers and help them and their students.

**The Philadelphia Tournament**

Coaches described the Philadelphia tournament as a true highlight of the season for their participating students. One coach noted that it was his students’ first time out of the state, and he and another coach spoke to the life-changing nature of tournament participation for their students. Other coaches noted that the tournament gave their students an important goal to work toward. Coaches only wished there were more tournaments and that more of their students could have participate.
Recommendations

Some coaches offered recommendations for Learn Fresh to implement in the future.

Many of the improvements that coaches suggested could be implemented fairly easily. Furthermore, they might make the game even more appealing and accessible. The following recommendations represent some of the coaches’ ideas and practices that could be incorporated into the program.

Increase Tournament Opportunities
There are a few ways Learn Fresh could make participation in a Math Hoops tournament more accessible: organizing larger tournaments, organizing more tournaments, creating separate afterschool and classroom brackets or tournaments, and connecting coaches with one another so they can organize their own tournaments locally. Coaches spoke glowingly about how valuable the tournament experience was for their students, and allowing more students to participate could have a positive impact on many kids.

Create Optional Extensions
Coaches noted that if the game could be extended beyond addition, subtraction, multiplication, and division, it could be exciting for older students and those looking for a challenge. Learn Fresh might consider incorporating percentages, decimals, or other types of operations into the game.

Consider Alternate Assessments
Coaches reported struggling with the assessments—getting students to engage with them and understanding the results. A shorter, digital assessment might prove more popular and allow coaches to understand student progress. Alternately, Learn Fresh might consider using the same assessment, but loading it into Google Forms or another digital platform for a less classroom-like feel.

Advertise Widely
To the extent possible, Learn Fresh might consider advertising more widely. Coaches, parents, and students find value in the game, and many more might benefit from the opportunity to participate.

Highlight Creative Coaches and their Ideas
Coaches’ enthusiasm about Math Hoops is contagious. Learn Fresh might consider featuring more veteran coaches on their website. It could be engaging to share some of their tips—for example, graphing
student progress over time, or developing systems for students to award one another with sportsmanship points. These ideas are in addition to the game rules, rather than instead of them, so coaches might enjoy learning about what their peers do and finding ways to extend the lessons from the club even further.