Parkwood Spring Break Program 2016

foundry10
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1.0. Introduction

1.1. Brief Overview of Program

During the spring of 2016, foundry10 teamed up with Shoreline School District to provide a week-long math and reading program that had an integrated drama component with the goal of enhancing student skills and motivation. Shoreline Schools Foundation and foundry10 partnered to create an original program at Parkwood Elementary School Spring Break 2016 where we joined creative/dramatic arts with traditional CORE curriculum for 5-days over Spring Break. Students testing at the cusp of being able to pass the SBAC in April were invited to the week-long intervention. Four teachers were recruited for the program that targeted 3rd through 6th grade students. From April 18-22, foundry10 instructors provided classroom instruction, including 20 hours of integrated and direct instruction with drama to explore the content and structure of stories.

1.2. Description of Student Data Collected by foundry10

1.2.1. Test scores

All students were assessed for math ability on the first and last day of the program. Math exam content was grade-specific, and is reported below as percentage correct. Later in the spring, Shoreline School District assessed math and reading ability with the Washington State Smarter Balanced Assessment (SBA). The Shoreline School District provided separate math and reading scores for analysis. For the Smarter Balanced Assessments, students fall into one of four categories of performance called achievement levels. Level 1 corresponds to a low score on the test, and level 4 corresponds to a high score. Students performing at levels 3 and 4 are considered on track to demonstrating the knowledge and skills necessary for college and career readiness.

1.2.2. Student-reported data

Students were asked to assess their own skills and opinions regarding math and reading. At the beginning and at the end of the weeklong program, students were asked to respond to the following Likert-type questions:

- How good are you at math?
- How good are you at reading?
- When I think about learning math I feel…
- When I think about learning reading I feel…

Response options were from 1 ("Not good") to 5 ("Great"). For each Likert-type question, students were also asked to write a response to the open-ended follow-up question, "How do you know?".

2.0. Analyses and Results

2.1. Analysis

Data was included in the analysis if PRE and POST scores were registered (n=49). PRE and POST math scores were compared. Change in scores overall, by grade level, and by self-reported math ability were calculated. SBA scores of the students who participated in the program were compared to 2015 state scores.

PRE and POST student self-ratings and qualitative responses were compared. Changes over time were calculated for student self-ratings. In addition to the above self-ratings, students wrote responses for why they game themselves a particular rating. Students' written responses were compared at the two time points, and were coded as either showing a clear positive change or not. For the students who did have a demonstrable change between time points, responses were further categorized by type or quality of change.

2.2. Test Results

On average, POST math scores were 26% higher than PRE math scores (mean of 67% vs. mean of 41%, *p*=0.000; Figure 1). Forty out of 49 students showed improvement in math scores, more than by chance (χ^2= 18.367, *p*=0.000). Improvements were consistent across all grade levels (Figure 2) and all levels of math ability, as self-rated by students at the start of the program (Figure 3). Average improvements for Grade 3 students were particularly large.

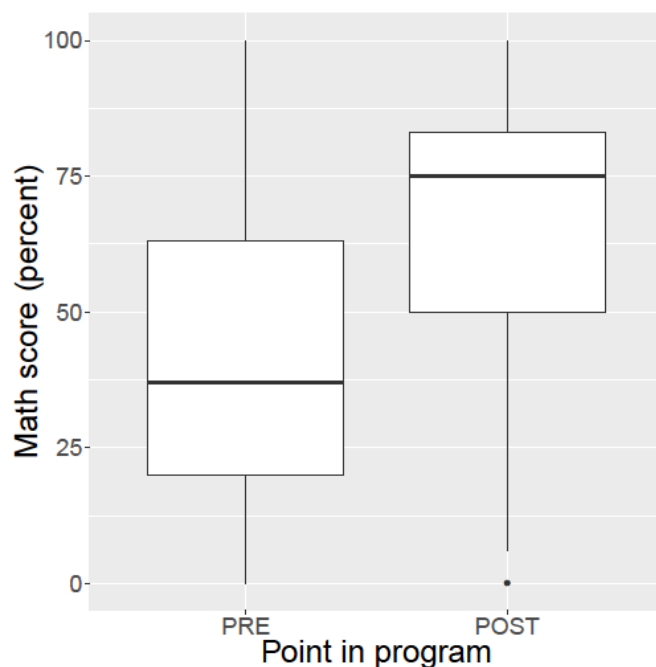*Figure 1. Change in math scores at beginning and end of program*

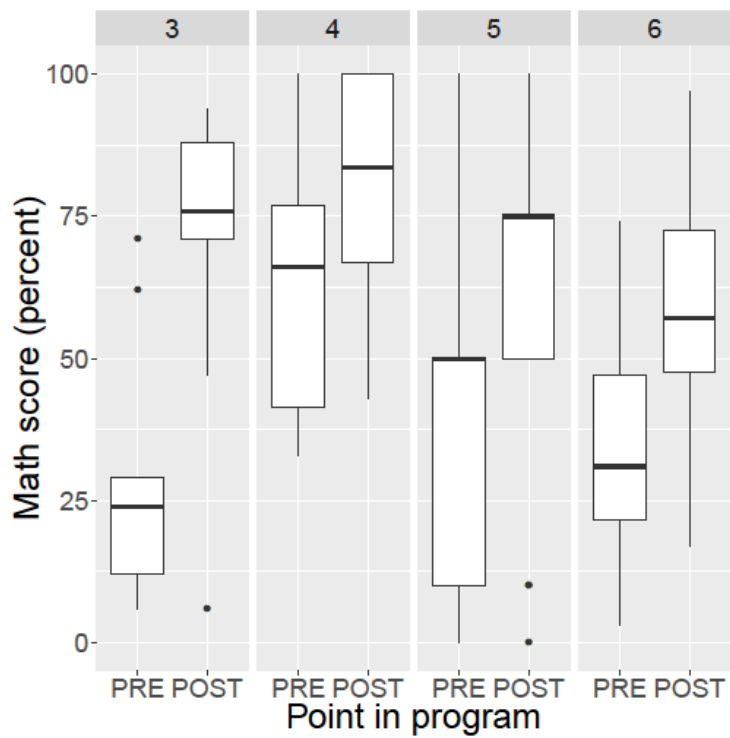*Figure 2. Change in math scores at beginning and end of program, by grade*
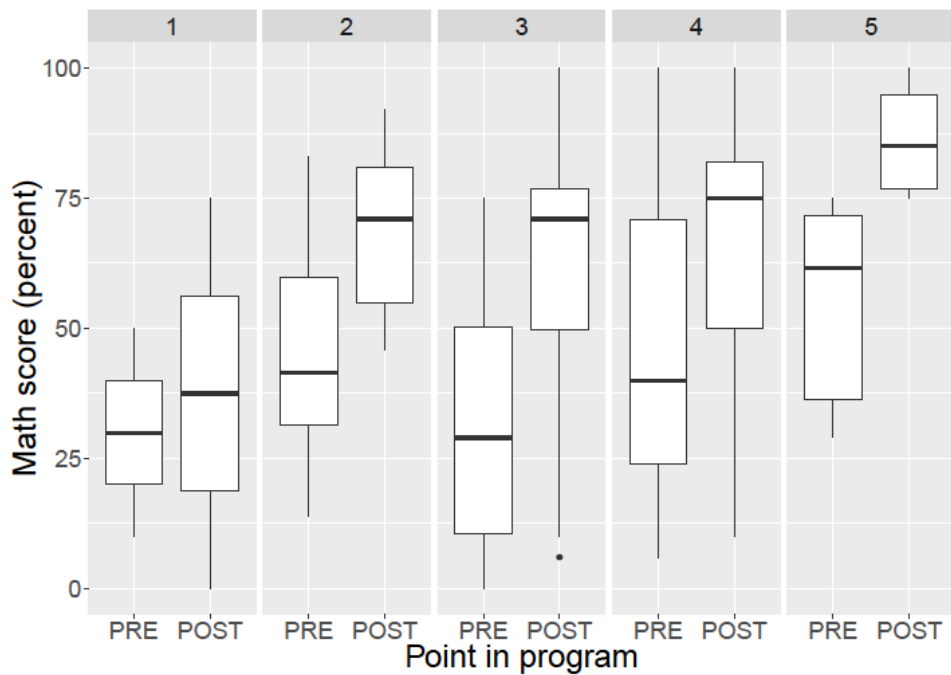

Figure 3. Change in math scores at beginning and end of program, by self-reported math ability at beginning of program

Figures 4-5 show how the SBA scores of the students who participated in the program compare to state scores from 2015. Ideally, the program would bring student scores in line with the state as a whole. For the most part, scores for students who participated in the program have a similar distribution to state scores, and in some cases scores for students in the program are actually higher on the whole than state scores. The program appears to have a particularly strong effect on SBA scores for grade 3 students. In grade 3, no students who participated in the program scored a 1 for math or for ELA, and almost 70% of students who participated in the program scored a 3 or 4 on the ELA exam.

Figure 4. Program and state SBA Math scores
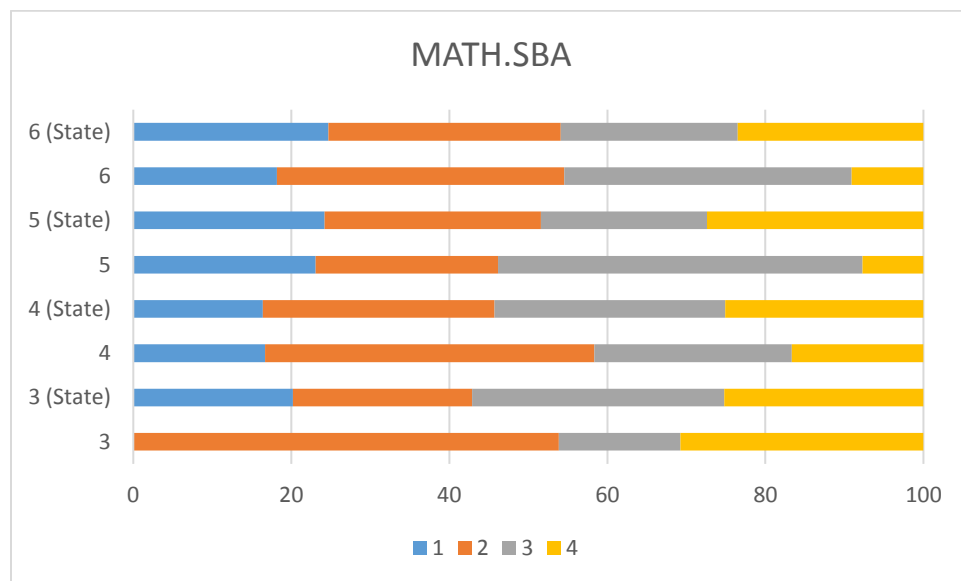
Figure 5. Program and state SBA Reading scores
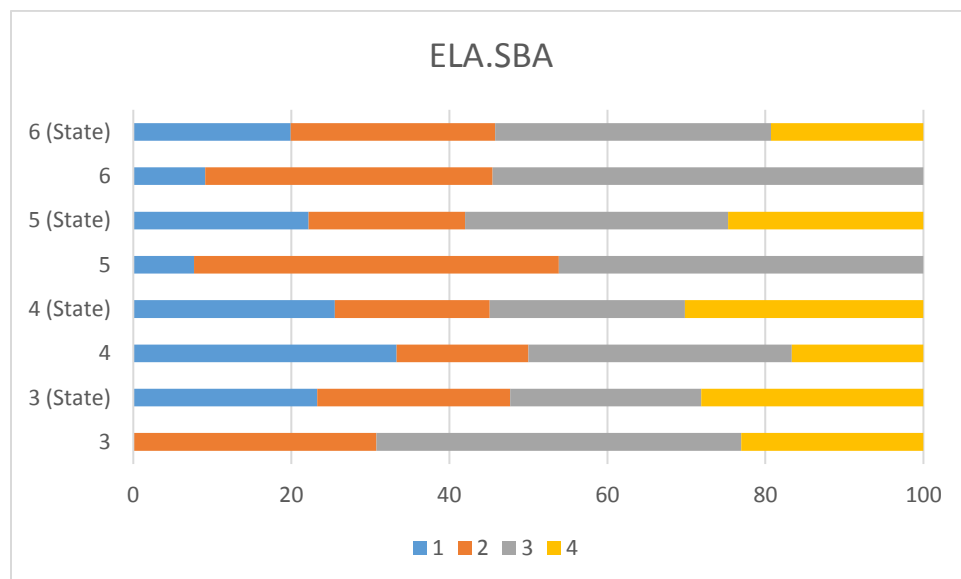
2.3 Student-reported results

Figure 6 shows changes over time in the student-reported responses. Overall, it appears that students' self-ratings of ability in and attitudes towards math and reading improved over time, although in many cases the sample sizes were too small to detect a significant change. 18 out of 49 students had a positive change in math ability self-rating. Fourteen out of 48 students had a positive change in reading self-rating. Using a Wilcoxon signed rank sum test, we found that math self-rating scores were higher after the program (V=190, p=0.000), and students had a more positive feeling towards math after the program (V=94.5, p-value = 0.043). However, changes in math ability self-rating were not strongly or significantly correlated with changes in math test scores (r=-0.039).

Figure 6. Changes in student math and reading self-assessment at beginning and end of program
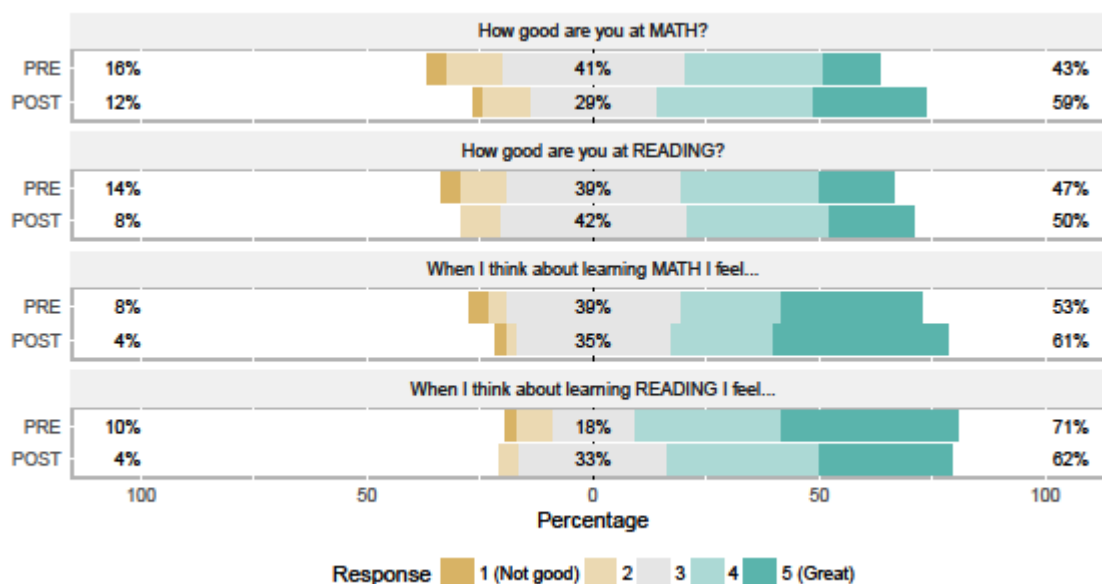

Table 1 shows summary statistics for students who showed a positive change in their written responses for each open-ended question. Roughly half of the students showed a clear positive change in the way they talked about their math and reading abilities. Large numbers of students also showed a positive change in the way they think about math and reading.

Table 1. Number of students coded as showing change in written responses

Question	Number of students (%) coded as showing positive change in qualitative response (total N = 49)
How good are you at math? How do you know?	24 (49%)
When I think about learning math, I feel… How do you know?	21 (43%)
How good are you at reading? How do you know?	24 (49%)
When I think about learning reading, I feel… How do you know?	15 (31%)

Figures 7-10 show student responses to open-ended questions where a positive change in response was observed and coded. Students' responses signaled a number of changes in attitudes towards math and reading that could be attributed to the program, including achievement, perception of hard work, an increase in engagement, an increase in enjoyment, a change from external to internal perception of skill, perception of an increase in scores, perception of an increase in skills, more positive responses over time, recognizing the importance of learning, and getting help in the subject. Among the most prevalent positive changes are increased enjoyment, achievements, and perception of skill increases.

Figure 7. Change in student PRE and POST responses to question, "How good are you at math? How do you know?"

Category	Before Camp	After Camp
Achievement ——— 4/24 - 16.6%	I get some answers wrong and some right	I've been doing good in math. I won bingo
	Because everyone says I'm good	Because I won bingo
	Because I get good grades and I'm confident	Because I have been doing really good this week
	Because I get good grades in it	Because I did good this week
Hard work ——— 5/24 - 20.8%	Sometimes I get good grades	I work hard
	Because I get bad grades and it is hard	I've been practicing
	because I get 3 and sometimes 4s	Because sometimes I will need help and sometimes I don't need help at all
	I need to learn the math table but I also get good grades	I still need to learn some stuff but I know, try hard, and get decent grades
	Because I sometimes get bad grades.	Because I'm practicing and I'm getting help from my teacher and Mark
Engagement Increases 1/24 - 4.1%	I'm 3 stars because I get good grades and my parents tell me to	I think I'm doing great because I'm learning more in spring camp
Enjoyment Increases ——— 5/24 - 20.8%	I feel I'm doing a lot wrong but I do get a lot right and my teacher said I'm good	Mrs. H said I'm really great at math and I love math
	I like it	It is easy and I love it
	I've practiced a lot and I'm good at it	I like doing work good at math
	My teacher says I am in the top......	It is so easy and fun and I do it fast too
	I know because sometimes I get 4+ and my teacher says I'm good at math	I know because I like it
External to internal perception ——— 3/24 - 12.5%	Because my teacher told me and my parents told me I'm good at math	I am better than good and less than fantastic so I'm great and my parents say I'm great so yeah
	My parents say I'm good and I like it	I can figure clues faster than most people
	I know because I like it and my teacher tells me that I'm good at it and by doing math it is fun for me	I know that because I have been working on math very well and it is easy for me
Perception of skill increases ——— 3/24 - 12.3%	Because I get bad grades and it is hard	Sometimes it is hard and easy
	I get bad grades	Cause I get some things right
	Because my teacher said I'm great	Because I figured out the multiplications chart
Scores Improve ——— 3/24 - 4.1%	ok grades challenging	Good grades, mom tells me
	I am not good at it	I get 1 or 3 on tests
	I mostly get 3s on my math	I mostly get all my answers right

Figure 8. Change in student PRE and POST responses to question, "When I think about learning math, I feel… How do you know?"

	Before Camp	After Camp
Achievement 2/21 - 16.6%	Because I feel like I don't get enough help and it's hard	Great because I proved myself wrong about fractions
	I don't really like math	Because I did good in math
Enjoyment Increases ———— 9/21 - 20.8%	Cause I learn something new all the time so I could get better grades and so I could teach my sister the math one day	Mrs. P makes it so fun! and learning something new is awesome
	I think that I'm happy about class because I learn more	When I think about learning math we did some fun things in my classroom
	Because I sometimes get a 4 on math and a 3	Because I like to learn
	Because it's easy and boring	Because it's fun
	Sometimes I don't like math and sometimes I do like learning math	Because it is different and it's fun
	I love math and I'm great and it's easy	I love math even more
	Math is not my favorite subject	It is not my favorite subject but I don't mind it
	I don't really like it but I'm fine with it	I don't like it but its fine. Its fun in this camp because its not like school
	Because sometimes I got 100%!	Because I feel awesome
External to internal perception 1/21 - 12.5%	I get good grades	I like it
Important to learn ———— 1/21 - 8.2%	Because I learn new stuff and I love math	I love math and I learn more stuff so when I get older I will know stuff that I need to know
More positive ———— 4/21 - 12.3%	Because I hate it	Because I am not sad when I learn math
	It takes too long	Cause I'm likely to be good at it
	Because I never understand what math is about	Because I learn new things. Sometimes its easy and sometimes it's hard
	Its hard	I got some things right
Perception of skills increases ———— 4/21 - 16.6%	Because I love math	Because now I do good at math
	Kinda hard to understand	I can learn new math
	Its so easy and hard	Math is easy
	It is really fun so it is fun for me	It is fun I love to learn it. It is exciting and I am better at it now

Figure 9. Change in student PRE and POST responses to question, "How good are you at reading? How do you know?"

	Before Camp	After Camp
Achievement ——— 7/24 - 16.6%	my mom and dad tell me I'm good	I get good grades
	I've read many books and I've taken tests and I get 5/5 or 9/10, 8/10	reading is good I'm doing well
	Because my mom tells me I am good at reading	I did pretty well with reading the packets
	My exile level is in the 1,000s	I did well this week with stories
	Because I'm reading more and more	I'm doing well in stories and no misswords
	Because I am confident and I sometimes get good grades	Because I did well this week
	Because when I check out one book and read the first sentence I don't know what I just read	Because I read an article and I answered the questions and I get them right
Hard work ——— 3/24 - 20.8%	When I take a test on a book I get a good score	I read a lot
	I get good grades I like reading	I practice a lot
	I'm 3 stars because I got out of Miss. Miner's Class	I'm good because I get a lot more practice
Engagement Increases 1/24 - 4.1%	I get okay grades and I like reading	Because reading owls was fun
Enjoyment Increases ——— 7/24 - 20.8%	I know because I read and each time I read I get good at it	Because I always want to read to my mom
	I do lots of reading	Its kinda fun
	Because I get it or not	Because I felt good
	I read every day	Because I like to read
	I know this because I get some good grades	I am good because some reading is really fun
	I've practiced a lot and I'm good at it	I like reading. Good at reading
	Because I read everyday and I am almost above grade standard	I like to read and I know that I am at standard for reading
Getting Help ——— 1/24 - 12.5%	Because it is hard to read	Because my teacher helps me
More Positive ——— 2/24 - 8.2%	I get bad grades and I don't like it that much	I know that because I read well and my parents sometimes tell me I'm good at it or great at it
	Because sometimes I got some words wrong	Because I know the words
Perception of skill increases ——— 3/24 - 12.3%	Because it is a little easy for me and I love the stories it is telling	It is easy
	I love reading I read at least 2 hours each day	It's fun, I like it. Its been getting better
	Because I'm kind of good at reading but not really good	I do really good at reading

Figure 10. Change in student PRE and POST responses to question, "When I think about learning reading, I feel… How do you know?"

	Before Camp	After Camp
Enjoyment increases ——— 7/15 - 46.6%	It's fun to tell the stories to other people and what if it was a fiction book it could be real and I could learn something about it	Fiction is real so by learning it and this week was awesome
	I like reading	I love reading
	It is hard to read some words	Because I know I want to read more
	Because I read and it feels good	Because I read about Sea Otters and Sea Otters are fun
	Because it's BORING	Because it's fun and boring
	I'm not bad or good yet I like it	Now I love reading just a little bit more
	Cause it feels like fun	Because it feels like an adventure and time goes fast
Importance of learning 2/15 - 13.3%	Because I want to have time to read and learn and have fun at the same time	Because it is good for me to have a skill you're good at
	Because when I read I just dont know what the words mean or I just don't understand what I'm reading about	I feel happy becasue I Just want to learn how and sometimes I don't know how to say words or what it means
Perception of skill improved ——— 6/15 - 40%	Because I get to read to my mom	Because I get to read with my mom and I can read out loud and my mom said I'm a great reader
	Because it brings adventure!	When I think about reading I feel like I get some practice
	I feel like this because the book is really good and I want to read more of it	Because I love reading because I can learn new words
	Reading is better than math and less hard	because it didn't make a lot of mistakes
	I love it! It's fun	It's fun and it got easier over this week
	Because I don't like it	Because I know the words and it's easy

3.0. Conclusions

Overall, students showed dramatic score changes before and after the weeklong camp. Increases in math scores cut across all grades and self-perceived skill levels. Although the small number of students participating in the program and the many other factors that play into student achievement makes any conclusions about the relationship between participation in the program and student achievement indefinite, it appears that participation in the program corresponds with SBA scores comparable or better than state averages. Overall, student self-ratings of math ability and attitudes towards math showed a significant positive change. Student perception of reading ability improved overall, though the sample size was too small to find a significant change. In their own words, students commonly expressed increased enjoyment, achievements, and increased skills in math and reading after the program, among other benefits.