William dela Cruz, Ed.D, Ph.D.
Hui Zhao, Ph.D.
Cinda Christian, Ph.D.

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Department of Research and Evaluation
Austin Independent School District

2018 ACE Austin Summer Program Report

Austin Independent School District

Program Description

Providing access to high-quality science, technology, engineering, and mathematics (STEM) education is a top priority in the United States and across the globe (Afterschool Alliance, 2016). More than ever, a large segment of employers require a STEM workforce of critical thinkers, analytical problem-solvers, life-long learners, and collaborators. With this in mind, Afterschool Centers on Education (ACE) Austin embraced a STEM-focus to expand their 2017–2018 ACE Austin summer program. Six of the 20 campuses in Austin Independent School District (AISD) in which there was an ACE Austin summer program (Langford, Oak Springs, Rodriguez, TA Brown, Wooten, and Widen) focused on STEM, while the remaining 14 campuses (Allison, Bedichek, Blanton, Blazier, Dobie, Govalle, Houston, Linder, Martin, Mendez, Ortega, Palm, Paredes, and Perez) continued with the regular summer program. The ACE Austin summer camp program was conducted from June 4 to July 20, 2018. This year, a total of 695 students participated in the ACE Austin summer camp program. Of these, 72% were in the regular program and 28% were in the STEM program. The ACE Austin summer program was funded by the Harman-Mayes-Sooch Family Fund and the Texas 21st Century Community Learning Centers.

This report compares the STEM-focused summer program and the regular summer program for the purpose of program planning and improvement. Since all participants in the STEM program were in the elementary level, all middle school students (152 out of 499) in the regular program were excluded from the analyses so as to provide a more balanced and accurate comparison between the regular program and the STEM program.

Participants' Demographics

The majority of ACE Austin summer camp program participants were in the regular program. As shown in Table 1, participants in the regular program (i.e., the sample study) and the STEM program had similar demographic distributions except for at the grade level. In the elementary study sample, a greater percentage of students in the STEM program than of students in the regular program were in the higher grade levels.

Table 1.
Most of the ACE Austin summer camp participants were in the regular program.

	Regular program all students (*n* = 499)	Regular program sample study (*n* = 347)	STEM program (*n* = 196)
Grade			
Kindergarten	4%	6%	2%
Grade 1	11%	16%	4%
Grade 2	16%	23%	19%
Grade 3	13%	19%	30%
Grade 4	13%	18%	21%
Grade 5	12%	18%	23%
Grade 6	16%		-
Grade 7	11%		-
Grade 8	4%		-
Gender			
Female	49%	52%	51%
Male	51%	48%	49%
Ethnicity			
Asian	1%	1%	1%
Black or African American	9%	12%	12%
Hispanic/Latino	81%	83%	84%
Two or more races	2%	1%	< 1%
White	7%	3%	3%

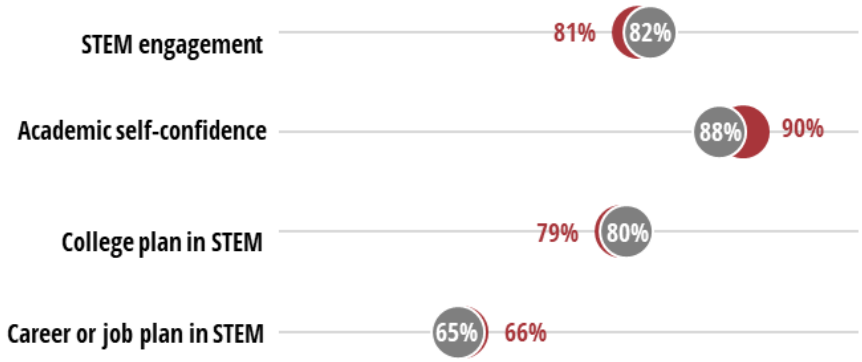
Source. 2017—2018 ACE Austin Summer Camp Student Survey and AISD student records

Key Findings

Student Engagement, Academic Self-Confidence, and College and Career or Job Plans in STEM

To examine change in students' perceptions of their STEM engagement; academic self-confidence; and college, career, or job plans in STEM, we administered pre- and post-surveys. Results revealed that both students in the regular summer program and students in the STEM summer program reported positive STEM engagement, high academic self-confidence, and a sense of being prepared for college and career or job plans in STEM at both the pre- and post-survey administrations. No significant differences between the pre- and post-tests were observed for either the regular summer program or STEM summer program students for any factor. In addition, there were no significant differences between STEM and regular summer program students on any of these factors.[1]

Figure 1.
At the post-test, students in both the STEM summer program and students in the regular summer program experienced positive STEM engagement, high academic self-confidence, and a sense of being prepared for college and career or job plans in STEM.



Source. 2017—2018 ACE Austin Summer Camp Student Survey
Note. No significant differences between the regular summer program students and the STEM summer program students were observed.

About the Survey

The AISD Department of Research and Evaluation (DRE) in collaboration with the Department of School, Family, and Community Education, conducted online pre– and post–surveys to evaluate the ACE Austin summer program from June through July 2018. This year, of the 499 students who participated in the regular summer program, 199 completed the pre - and post-surveys, and of the 196 students who participated in the STEM summer program, 77 completed the pre– and post–surveys.

The electronic pre- and post-surveys consisted of 9 items with response options that ranged from 1 = *disagree a lot* to 4 = *agree a lot.* Percentages reflect students who selected 3 = *agree a little* or 4 = *agree a lot.* Each item in the survey was grouped according to its underlying factor or construct, as follows:

STEM Engagement:

- I am interested in learning about STEM
- I enjoy reading STEM books and other materials

Academic Self-confidence:

- I learned new STEM lessons this month
- I can use my STEM lessons in my life outside of the classroom
- I believe STEM is important to help solve the problems of daily life
- I try hard to do my best work
- I like to think of different ways to solve a problem

College Plan in STEM:

- I would like to study STEM courses in college

Career or Job Plan in STEM:

- I would like to have a STEM job or career

School and Behavioral Environment, Summer Camp Learning, and Student Attitude Toward Summer Camp

To examine students' perceptions about their school and behavioral environment, summer camp learning, and attitude toward the ACE summer camp, we administered seven additional items at the time of the post-survey. Participants were asked to indicate their level of agreement with the survey items. Each item was grouped according to its underlying factor or construct: school and behavioral environment ("I feel safe at my summer camp" and "I am happy with the way other kids treat me at the summer camp"), summer camp learning ("I get to learn things in summer camp that are not normally taught during the regular days"), and student attitude toward summer camp ("I like to come to summer camp," "I enjoy my summer camp activities," " I have fun in my summer camp activities," and "I look forward to participating in a summer camp next year").

Although students in both the regular summer program and the STEM summer program reported positive perceptions on all three factors (i.e., school and behavioral environment, experienced novel summer camp learning, and positive attitudes toward summer camp), no significant differences were observed in the post-survey ratings between the regular summer program and the STEM summer program for any factors (Figure 2).

Figure 2.

Both students in the regular summer program and students in the STEM summer program reported positive perceptions of their school and behavioral environment, experienced novel summer camp learning, and had positive attitudes toward summer camp.

Source. 2017—2018 ACE Austin Summer Camp Student Survey

Note. No significant differences between the regular summer program and the STEM summer program students were observed in the post-survey ratings.

STEM Summer Program Students Assessment Scores

To determine how well the students in the STEM summer program performed in Engineering for Elementary (EiE) topics (i.e., solids and liquids and sinking and floating), we conducted STAARburst pre- and post-assessment tests.[2] A total of 160 tests were taken by students in the STEM summer program. As shown in Table 2, students showed improvement on 89 out of 160 (56%) tests taken by STEM summer camp students from pre- to post-assessment scores, while student performance declined on 55 (34%) tests taken in the same assessment time frame, and no change was observed on 16 (10%) tests. Additionally, on average, students showed a 2-point increase in the solids and liquids topic and a 6-point increase in the sinking and floating topic from their pre- to post-assessment scores. However, only the change from pre- to post-assessment scores in sinking and floating was statistically significantly different.

Table 2.
On average, students in the STEM summer program showed a 2-point increase (↑) in solids and liquids topic and a 6-point increase in sinking and floating topic from pre- to post-assessment scores.

	Assessment scores			Number of students whose...		
Topic	Average pre-assessment	Average post-assessment	Difference	Scores increased from pre- to post-assessment	Scores decreased from pre- to post-assessment	Scores did not change from pre- to post-assessment
Solids and liquids (*n* = 69)	52	54	↑ 2	38	29	2
Sinking and floating (*n* = 91)	32	38	↑ 6	51	26	14
Total (N = 160)	NA	NA	NA	89	55	16

Source. 2017 - 2018 ACE Austin summer program data

Note. * Paired *t* tests were conducted to determine if there were statistically significant differences between solids and liquids and sinking and floating pre- and post-assessment scores. Results revealed a statistically significant difference between pre- and post-assessment sinking and

Recommendations

In summary, students in both the regular summer program and the STEM summer program experienced positive STEM engagement; high academic self-confidence; a sense of being prepared for college, job or career in STEM; a favorable school and behavioral environment; novel summer camp learning; and positive attitudes toward summer programming after attending the ACE Austin summer camp program. Additionally, on average, students in the STEM summer camp program showed an increase on assessments of their understanding of sinking and floating concepts over the course of summer program. While the ACE Austin summer program has made great strides toward providing STEM-focused summer camp activities, work remains to be done to further improve the program's STEM-specific outcomes. In addition, program staff indicated that the timing of administration between pre- and post-surveys may have been too short to see any significant change on the various factors examined. Therefore, the timing of the administration of surveys should be investigated as this might have contributed to the mixed results of this report. Lastly, many instructors find 1 month too brief for the specific STEM topics covered, considering the broad range of skills needed to teach the topics. Hence, it may be beneficial to include simpler, more interactive, and/or fewer topics in future iterations of the STEM summer program.

Endnotes:

[1] Paired *t* tests were conducted to determine if there were significant differences between the pre- and post-survey ratings on STEM engagement, academic self-confidence, and college, career, or job plans in STEM at the $p = .05$ level of significance. Results revealed no significant differences between the pre- and post-tests for either the regular summer program or the STEM summer program for any factor.

[2] STAARburst pre- and post-assessment scores were based on EiE, an engineering curriculum for learners in grades 1 through 8, developed by the Museum of Science, Boston. This year, the unifying topics selected for the pre- and post-assessments were solids and liquids, and sinking and floating.

Reference:

Afterschool Alliance. (2016). *Full STEM ahead: Afterschool programs step up as key partners in STEM education* . Retrieved from http://www.afterschoolalliance.org/aa3pm/STEM/pdf

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Cinda Christian, Ph.D.

Department of Research and Evaluation
1111 West 6th Street, Suite D-350 | Austin, TX 78703-5338
512.414.1724 | fax: 512.414.1707
www.austinisd.org/dre | Twitter: @AISD_DRE

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