



FIRST Robotics Engagement Report

22 August 2019

Confidentiality Notice: This document is confidential and contains proprietary information and intellectual property of Central Creativity. Neither this document nor any of the information contained herein may be reproduced or disclosed under any circumstances without the express written permission of Central Creativity.

FIRST Robotics: The Rollout

Central Creativity (CC) started promoting robotics as a citywide platform for growing critical and creative thinking skills in the 2018-19 school year, during CC's second year of operations. Prior to this implementation, CC had spent several years looking for a technologically competitive educational program that embraced critical thinking, 21st-century skill development, emotional intelligence, and community engagement. After much observation and deliberation, we chose to recommend and implement the FIRST robotics program within our geographical area.

In order to reduce barriers for implementation within our partner schools, we implemented grade cluster groupings as a further participation filter, in addition to age requirements. This created a simplified progression path for students to transition from one program to the next. The groupings we support include First Lego League Junior (Grades 1-3), First Lego League (Grades 4-6), First Tech Challenge (Grades 7-12).

In its inaugural season, Central Creativity formed, coached, and sponsored 18 FIRST teams at 7 schools, exposing 160 students, 19 teachers, 8 school administrators, and 342 parents to the joys of competitive robotics every week from September through April.

- Laurel City Schools (48 Students)
 - Laurel High School – 2 First Tech Challenge Teams (34 Students)
 - Maddox Elementary School – 1 First Lego League Team (14 Students)
- Laurel Christian Schools (48 Students)
 - High School – 1 First Tech Challenge Team (10 Students)
 - Elementary School
 - 3 First Lego League Jr. Teams (22 Students)
 - 2 First Lego League Teams (16 Students)
- St. John's Day School (24 Students)
 - Elementary School
 - 3 First Lego League Jr. Teams (18 Students)
 - 1 First Lego League Team (6 Students)
- Laurel Homeschool Educators Group (17 Students)
 - Primary Age Group
 - 1 First Lego League Jr. Team (6 Students)
 - 1 First Lego League Team (6 Students)
- Central Creativity
 - Afterschool Program (23 Students)
 - 1 First Lego League Jr. Team (6 Students). Special Needs Students.
 - 1 First Lego League Team (9 Students)
 - 1 First Tech Challenge Team (8 Students)

This turnout was unexpectedly large, considering that Laurel has 18,770 residents, of which only 5,368 of those residents are below the age of 18.

FIRST Robotics: The Backstory

It is difficult to understand how impressive this adoption rate was, without knowing some background information about the area and Central Creativity.

The Birth of Central Creativity

Dr. Marjann Ball, Central Creativity’s Executive Director, is a nationally recognized leader in brain-based research who spent over 40 years in Mississippi’s classrooms, showing teachers how to help students become more powerful critical and creative thinkers. In 2015, after having worked with over 300 schools across several decades, she realized that there was a need to create centralized repositories of leading-edge educational resources and pedagogy that could support the growth of ALL learners within communities. What better place to begin the journey than her own town? Thus, Central Creativity opened its doors in July 2017 and began to support every learner and institution of learning in the area, both public, private, and homeschool.

The Educational Landscape

The City of Laurel has been experiencing decades of decline in its skilled labor force population, losing these critical people to the surrounding county areas. One of the biggest reasons for this was a lack of strong educational offerings in the City School system.

- **Laurel School District**

- In 2016, the Laurel City Schools were rated an “F” by the Mississippi Department of Education.
- They had a population of 3177 students.

Group Name	Group Number	Group Percent (%)
Female	1542	48.54%
Male	1635	51.46%
Asian	*	<=5%
Black	2762	86.94%
Hispanic	265	8.34%
Native American	*	<=5%
White	104	<=5%
Multi-Racial	37	<=5%
Pacific Islander	*	<=5%

- Proficiency in Subject Area ratings were:
 - English Language Arts: 25.8%
 - Mathematics: 23.5%
 - Science: 45.6%
 - U.S. History: 37.6%
- Student to teacher ratio 24:1
- Experienced Teacher percentage was 49.3%
- High School Graduation Rate: 72.7% (State Average: 82.3%)
- Chronic Absenteeism: 19.9%
- Suspension (Both in and out-of-school): 23.8%
- College & Career Readiness: 20.4%

FIRST Robotics: The Backstory

The Educational Landscape: Continued

- **St. John's Day School**
 - In 2016, SJDS had a population of 131 students in grades PreK-6
 - Tuition cost \$5,700 annually
 - Proficiency in Subject Area ratings, as recorded on the Stanford Achievement Test (SAT) were:
 - English Language Arts: 55.8%
 - Mathematics: 43.5%
 - Science: 59.8%
 - Student to teacher ratio 12:1
 - Experienced Teacher percentage was 59.1%
 - Chronic Absenteeism: 12.2%
- **Laurel Christian School**
 - In 2016, LCS had a population of 435 students enrolled in grades PreK-12
 - Tuition cost \$4,500 annually
 - Proficiency in Subject Area ratings, as recorded on the Stanford Achievement Test (SAT) were:
 - English Language Arts: 77.3%
 - Mathematics: 74.8%
 - Science: 71.4%
 - Student to teacher ratio 15:1
 - Experienced Teacher percentage was 61.1%
 - Chronic Absenteeism: 9.3%
 - 85% of high school graduates attend college
- **Laurel Homeschool Educators Association**
 - In 2016, LHSE had a population of 1643 students in grades PreK-12
 - Student to teacher ratio 3:1
 - 79% of homeschooled students attend college

FIRST Robotics: The Impact

At the end of the first year of implementation, the FIRST robotics experience had created a marked impact on the educational institutions in the area, as well as the community at large.

- **Laurel High School**
 - Program ran from November 2018 - March 2019
 - Both teams started the season two months late.
 - Both teams successfully built working robots.
 - One student performed so well that he was accepted into the Mississippi School for Math and Sciences
 - Absenteeism rates for robotics participants was 22.9% prior to the beginning of the program.
 - Absenteeism rates for robotics participantx was 2.5% during the course of the program.
 - Student satisfaction rating was 99.9%
 - LHS was able to raise \$6,000 from local donors to support the continuation of the program
- **St. John's Day School**
 - Program ran from September 2018 - April 2019
 - Absenteeism rates for robotics participants was 12.2% prior to the beginning of the program.
 - Absenteeism rates for robotics participant was 0.6% during the course of the program.
 - Student satisfaction rating was 96.4%
 - SJDS used the success of their robotics program to assist in their capital giving campaign for school infrastructure growth
 - End of Year Stanford Achievement Test (SAT) scores for students who participated in robotics were as follows:

SJDS Year One Results

2017 - 2018 SCHOOL YEAR - STANFORD ACHIEVEMENT TEST					
(GRADES K-2 ENVIRONMENT SUBTEST SCORES)					
GRADE LEVEL	National Individual PR / S	Mean National NCE	AT OR ABOVE THE 50TH NATIONAL PR	MEDIAN GRADE EQUIVALENT	GRADE LEVEL CHANGE
K	71 / 6	62.0%	80.0%	1.2	1.2
1	63 / 7	70.5%	84.0%	3.5	2.5
2	73 / 8	62.8%	84.0%	4.1	2.1
Average Grade Level Change					1.9

2017 - 2018 SCHOOL YEAR - STANFORD ACHIEVEMENT TEST					
(GRADES 3-6 SCIENCE SUBTEST SCORES)					
GRADE LEVEL	National Individual PR-S	Mean National NCE	AT OR ABOVE THE 50TH NATIONAL PR	MEDIAN GRADE EQUIVALENT	GRADE LEVEL CHANGE
3	66 / 6	58.5%	59.0%	4.4	1.4
4	66 / 6	58.7%	61.0%	5.7	1.7
5	67 / 6	59.2%	80.0%	7.7	2.7
6	61 / 6	56.0%	59.0%	8.0	2.0
Average Grade Level Change					2.1

2017 - 2018 SCHOOL YEAR - STANFORD ACHIEVEMENT TEST					
(GRADES 3-6 THINKING SKILLS SUBTEST SCORES)					
GRADE LEVEL	National Individual PR-S	Mean National NCE	AT OR ABOVE THE 50TH NATIONAL PR	MEDIAN GRADE EQUIVALENT	GRADE LEVEL GROWTH
3	75 / 6	64.5%	71.0%	5.2	2.2
4	69 / 6	60.6%	61.0%	5.9	1.9
5	77 / 7	65.9%	73.0%	8.8	3.8
6	63 / 6	57.1%	65.0%	8.5	2.5
Average Grade Level Change					2.7

SJDS Year Two Results

2018 - 2019 SCHOOL YEAR - STANFORD ACHIEVEMENT TEST					
(GRADES K-2 ENVIRONMENT SUBTEST SCORES)					
GRADE LEVEL	National Individual PR / S	Mean National NCE	AT OR ABOVE THE 50TH NATIONAL PR	MEDIAN GRADE EQUIVALENT	GRADE LEVEL CHANGE
K	71 / 6	62.0%	80.0%	1.2	1.5
1	63 / 7	70.5%	84.0%	3.5	2.8
2	73 / 8	62.8%	84.0%	4.1	2.9
Average Grade Level Change					2.4

2018 - 2019 SCHOOL YEAR - STANFORD ACHIEVEMENT TEST					
(GRADES 3-6 SCIENCE SUBTEST SCORES)					
GRADE LEVEL	National Individual PR-S	Mean National NCE	AT OR ABOVE THE 50TH NATIONAL PR	MEDIAN GRADE EQUIVALENT	GRADE LEVEL CHANGE
3	66 / 6	58.5%	59.0%	4.4	1.7
4	66 / 6	58.7%	61.0%	5.7	2.2
5	67 / 6	59.2%	80.0%	7.7	2.9
6	61 / 6	56.0%	59.0%	8.0	2.4
Average Grade Level Change					2.5

2018 - 2019 SCHOOL YEAR - STANFORD ACHIEVEMENT TEST					
(GRADES 3-6 THINKING SKILLS SUBTEST SCORES)					
GRADE LEVEL	National Individual PR-S	Mean National NCE	AT OR ABOVE THE 50TH NATIONAL PR	MEDIAN GRADE EQUIVALENT	GRADE LEVEL GROWTH
3	75 / 6	64.5%	71.0%	5.2	2.3
4	69 / 6	60.6%	61.0%	5.9	2.2
5	77 / 7	65.9%	73.0%	8.8	3.4
6	63 / 6	57.1%	65.0%	8.5	3.5
Average Grade Level Change					3.0

- *As can be seen, students who participate in robotics increased an average of at least two grade levels in the areas of science and thinking skills over their peers.*

FIRST Robotics: The Impact

- **Laurel Christian Schools**
 - Program ran from September 2018 - April 2019
 - Absenteeism rates for robotics participants was 13.5% prior to the beginning of the program.
 - Absenteeism rates for robotics participant was 1.4% during the course of the program.
 - Student satisfaction rating was 98.2%
 - According to school administration, at the end of year one student enrollment grew from 427 to 465 as a direct result of the success of their robotics program.
 - LCS Elementary SAT scores for students who participated in robotics increased an average of 17 percent over their peers in the areas of mathematics, science, and life skills. Additionally, students involved in the robotics program increased their classroom performance by an average of 19 percent, according to school records.
 - LCS Elementary was so impacted by the program that, in their inaugural year, they hosted the state of Mississippi's first every dedicated First Lego League Junior Expo.
 - LCS High School's FTC team Javawocky made it all the way to the state finals and was the runner-up to the Inspire Award.
 - LCS High School's FTC team captain, Maddy F., became an FTC intern at the 2019 FIRST Robotics World Championships. Maddy graduated and entered the engineering program at the University of Alabama, having changed her major as a result of her experience with FIRST in her senior year.
 - All seniors on the FTC team entered college in STEM-related fields.
- **Laurel Homeschool Educators**
 - Program ran from September 2018 – April 2019
 - 85% of the students who participated also enrolled in Central Creativity's Science Lab and Digital Media Lab programs, gaining exposure to advanced laboratory experiences.
 - Student satisfaction rating was 95.3%
 - Inclusion students were able to complete the entire program in an integrated environment
 - Absentee rate for participants was 0.5%
 - Class size grew steadily throughout the year
 - Due to the success of the program, Central Creativity was asked to present at the area Homeschool conference this year. Pre-enrollment is already above last year's levels.
 - Several LHSE students were selected to represent the Laurel/Jones County region at a national Homeschool STEM competition in Houston, TX this past summer. They performed at the highest levels.
- **Central Creativity**
 - Program ran from September 2018 – April 2019
 - Non-robotics afterschool enrollment grew 39% due to cross-enrollment from robotics students
 - Team Lego Force One was an FLL team composed entirely of special needs students. This team won the Judges award at their first regional qualifier. Every student completed the program successfully and has registered to return this upcoming season. For many, this was the first team experience in which that they had ever participated.
 - Team Spare Parts, the FTC team, was composed of students from four different counties. Over half of this team traveled more than an hour (each way) to participate. Every student completed the program.

FIRST Robotics: The Impact

- **Central Creativity**
 - Central Creativity helped a parent mentor whose family lived 90 miles away, start their own FTC team for this upcoming school year, introducing the FIRST experience to an entirely new geographical area. This has added 8 new students to the FIRST robotics family.
 - Absentee rates for the various programs averaged out to be 0.8%.
 - Student satisfaction rating was 98.8%
 - Two additional FTC teams are being started in the surrounding area as a result of the positive experiences families had with FIRST in year one.
 - Central Creativity's FIRST Robotics Lead Coach (Rhye McLeod) was asked to be an FTC Controls Judge at the 2019 FIRST Robotics World Championships.

FIRST Robotics: The Hidden Engagement

These statistics are powerful, but they do not tell the complete story. FIRST Robotics not only changed the parental expectations for what a quality educational experience should look like, it instilled a sense of purpose in our community to continue the pursuit of educational excellence...for ALL of our learners. Throughout the course of this past season, students from the public, private, and homeschool teams (and their families) that Central Creativity sponsored would meet and assist each other at robot build days and project mentoring sessions. They worked closely and learned to rely on one another for inspiration and advancement. This forging of relationships extended to the instructional and administrative staff at our various partner schools, as well. The result is that our entire community has taken ownership of the desire to see robotics help carry our children to a brighter educational future.

Here are a few of the projects that are currently being enacted, or investigated, as a direct result of the thirst to expand opportunity that stemmed from the development of FIRST Robotics in our area:

1. Central Creativity has partnered with the Laurel School District's Upper Elementary School and NASA's Office of Education to create a pilot program that integrates NASA-infused STEAM experiences into the daily curriculum to drive growth and engagement in science and mathematics.
 - a. Central Creativity has entered into a formal relationship with NASA, Jones College, the University of Mississippi, and the Laurel School District to create a 5-Year longitudinal program whose goal is to create a NASA-inspired blueprint for growing student success and workforce readiness.
2. The high school's success with robotics reinforced their desire to create a 6th-8th grade STEAM Academy and are currently seeking funds and community support to repurpose a building and introduce the opportunity by year 2023.
3. The Laurel School District has asked Central Creativity to create an FTC program at Laurel Middle School for grades 6-8.
4. The City of Laurel Public Library System has asked to partner with Central Creativity to write grants seeking funding for installation of a Maker Space and STEAM engagement program for the underserved community.

5. Sanderson Farms, Mississippi's only Fortune 500 company, co-hosted the inaugural 21st-Century Learning Landscape Forum this summer with Central Creativity to connect the educational and workforce communities together. FRC Team 456 was a key presenter, along with Ms. Carolyn Arthurs.

FIRST Robotics: Is It Worth the Investment?

All too often in education, business, and life, we ask ourselves, "How much will this particular thing cost to implement." While this is certainly a valid thought, we often fail to consider the more significant question of how great will the impact be and how long will the effect be felt?

It is hard to imagine an entity like NASA, arguably the nation's most sophisticated scientific body, embracing a small failing school district in a state that is ranked 50th in education. It is humbling to imagine that leading universities and Fortune 500 corporations are willing to invest in the future of such an economically disadvantaged community. Without the framework that FIRST Robotics brought to our area and the implementation support that Central Creativity received from the regional and state directors; Carolyn Arthurs, Mannie Lowe, and Teresa Lanum (FRC, FTC, and FLL respectively), none of these opportunities would have happened.

If asked why FIRST Robotics matters to this area, it is because FIRST truly does inspire. It inspires communities, young and old alike; regardless of experience or station. For our community, FIRST Robotics has provided a universal language of acceptance, purpose, hope, and opportunity that hasn't been experienced in a generation.

At Central Creativity, we are so grateful that we chose to make the investment in FIRST. The return has been beyond all expectation and measure.