

# **The Case for a Science Team and Lego Competition in Our Service Area**

by

**K. W. Nicholson**

**CACC Physics Department**

**ph 256 215 4336**

**email: [nnicholson@cacc.edu](mailto:nnicholson@cacc.edu)**

**webpage: <http://caccphysics.cacc.cc.al.us>**

## **Target Audience for This Proposal**

**Dadeville elementary**

**Stephens elementary**

**Horseshoe bend k12**

**Central elementary coosa county**

**Reeltown k12**

**Edward Bell k12 and maybe**

**Pinecrest elementary (talladega county)**

**Tallasse elementary (elmore county)**

# Narrative

## The Need

I think probably everyone here is aware of what I call the "the big bang theory complex", that is, the cultural stigma attached to an interest in math and science related professions.

I didn't realize how real it was until the last two years of trying to recruit for the stem camp.

It is real and it is a common problem everywhere. I've watched students take an application from me only to have it jerked out of their hands by their peers and thrown on the ground. I've heard teachers ridicule students for showing an interest in the STEM camp.

I attended a nano-tech workshop at Penn State last year.

They have an intense summer program for 18 hours credit. It is an amazing program.

Terry Kuzma teaches most of the courses. He's probably one of the smartest guys I've met.

Penn State hires some of their graduates to go out to all the high schools in Pennsylvania to promote his program.

During our orientation Terry was describing this promotion campaign and mentioned that they had over a thousand students paraded through the nanotech facility each year trying to interest them in nano-technology. Then he volunteered in a somewhat frustrated voice, that they got an average of two students out of that effort. All the rest come for the free food and to get out of class for the day.

Lots of people are doing lots of things to try and overcome this lack of interest problem, yet we are still losing ground.

Between 1996 and 2006 40 of every 100 students that entered high school in Alabama never finished. 82% of those drop-outs were boys. Assuming that approximately half the kids in high school are boys, that means 33 out of 50 or 66 out of 100 boys do not finish high school in Alabama.

The National Bureau of Labor predicted in 1996 that America needed to produce 750,000 new engineers by 2006. According the American Society of Engineers we only produced 440, 000 in that ten years. (China produced 450,000 in 2006 alone).

(The top 25% of china's elementary school students outnumber total enrollment in elementary school students in the entire western hemisphere, that is an ominous statistic.)

Between 1996 and 2006 the number of people majoring in engineering dropped 15 % in spite of the fact that the number of people attending college increased by 15%.

I want you to think about that for a minute. In an era when science and technology literally rule the world, and whose influence on the success of a nation will continue to increase at an accelerated rate for the for seeable future, we have a negative stigma attached to those subjects and (surprise, surprise) a diminishing number of young people interested in these subjects. And at a time

when unskilled labor job opportunities are galloping down the road to extinction at a thunderous rate, we have one of the highest dropout rates in the industrialized world.

Aside from the bad PR from sit-coms, why is it so hard to battle the stigma? What are we doing wrong?

My experience conducting the lego competition in our stem camp together with observing science teams in action for the past 12 years has given me some motivation for a plan.

**First: We need to study sports and see what we can learn from them.**

Young people are willing to work so hard at sports they throw up from exhaustion. Why is that? I think it is more than just love of sports or drive to win.

Why are students so willing to work so hard for sports but not for academics, or even money?

**Maybe it is because kids hunger for activities in which they can engage in cooperative or (team) efforts in a competitive environment in the hopes of receiving some kind of recognition from both their peers and their society. My experience with STEM Camp seems to verify that hypothesis.**

Last year several of our campers had, at best, a casual if not hostile attitude toward the camp. (I know one was forced by parents to come and another that was forced to come by his big brother, who attended the year before. ) We begin the camp with the Lego competition for the first two days. Basically we have four races, two each day. Most of them started with half-hearted efforts. But by the end of the first day, attitudes had noticeably changed. Several asked when they could come the next morning. I replied that we begin at 8:00, but that I would be there at 7:30. When I arrived at 7:15 the next morning there were nearly a dozen waiting to get in. We give them snacks at 10 and lunch at 11:30. Only a few stopped for snacks, and none of them would stop for lunch until, after telling them that lunch was ready three times, in exasperation the lady threatened to take away the food if they didn't come immediately. We were supposed to finish at 3 PM. We finally finished at 3:30, over the objections of more than a few. They weren't done yet.

Since there was never any emphasis on winning, and everyone already knew that the prizes were just twelve dollar calculators, I seriously doubt that winning was the motivating factor. I think everyone was simply excited by cooperative engagement, the constant attention of coaches, and the act of competing.

**Our k12 kids are drowned in opportunities to engage in sports activities every year from grades 3 or 4 clear through high school.**

**In order to increase the number of students interested in science and technology I believe we need to adopt the same strategy. Three questions spring forward immediately.**

**What are we to do, how much will it cost, and , most importantly, who are we going to get to do it?**

**Second, we need to formulate a plan. I have one, here it is.**

## **What should we do?**

**Do science activities with third graders**

**Coach "mini lego league" for grades 5 & 6 in spring**

**Coach real FLL team for grades 7 - 9 for state competition for six weeks in fall.**

**Organize a FTC team and perhaps even a FIRST team for grades 10 - 12.**

## **How much will it cost?**

**Cost will be a major factor for FTC and FIRST Robotics. Here are the costs in round figures, which include robot kits and registration fees, with some added for miscellaneous costs.**

"mini lego league" - a lego mindstorm kit and a computer,  
both of which I am prepared to provide for free.

FLL - \$500

FTC - \$1500

FRC - \$7000 - \$10000, plus, a professional engineer as a mentor is required, deep pocket sponsors also highly recommended.

## **Why robotics competition?**

**Because of my personal experience with the STEM camp lego competitions and because of some case histories about Lego leagues. (See Appendix I for the whole nine yards.)**

## **(Samples.)**

### **Case Histories:**

*»Just 5 years ago, East Tech, an urban high school located in the center of Clevelands most impoverished housing project was slated for closing.*

*What FIRST opened up for these students can be seen in their achievements. Weve become the science/engineering magnet school for all the district. More students try out for the FIRST team than for football and basketball combined.*

*12 students, including 5 females, representing the first class to experience four years in FIRST, all from inner city neighborhoods, all received scholarships and went on to the following schools: Case Western Reserve; Cornell; MIT; University of Dayton; Cleveland State; Air Force Academy; Ohio State; Allegheny College; Mount Union College; Georgetown.*

**Mr. Jerome Seppelt FIRST Program Manager, East Technical High School, Cleveland,OH**

**Who should we get to do it?** Well, what usually happens is everybody sits around and expects some teacher to come forward and do it, for nothing, simply because they “enjoy what they are doing and are dedicated.” And many do. But what eventually happens to volunteer science program sponsors is that they get burned out and their spare time eventually dwindles to zero. I can just about guarantee that most sports coaches “enjoy what they are doing and are dedicated”, but nobody ever expects them to do it for nothing. In fact, many of them get paid more than teachers.

**So let's review.** Everyone recognizes the importance of sports in our young people's lives and we pay to make certain these programs persist, yet while their interest in STEM is as important, if not more, for the well being of this country, we leave these programs to the casual interest of occasional teachers.

I believe we should form a dependable science team and have them do it. The cost of a science team to serve our service area of 6 schools is about the salary of a single high school teacher.

### **Brief History of the Science Team**

This is the thirteenth year we have had a science team at CACC. I first got the idea for a science team at a national two year college physics teacher's meeting from a casual conversation with a friend, Marie Plum, who taught physics at a community college in New York State. She taught a 2-hour course, organized and attended the third grade sessions with her students.

My students find their own third grade class, organize their own schedule of 5 visits per semester, and make up about half of their own activities. (The rest come from our box of tricks.) For this effort they get a polo shirt with their name on it and bonus points that amount to 3 % of their grade.

## **Anecdotal Justification**

My students are happy. (Watch them come in after a third grade session and you'd agree.)

The third graders are happy. Go watch an activity session and you could not believe otherwise.

The third grade teachers are happy. (To date I've never received anything but enthusiastic responses from teachers.)

I've gone with students to do an activity for the first time, prepared to do activities with a class of 20 or so, and had a principal stop us in the hall and ask if we'd mind performing for the entire third grade class of 60.

I've had a science team do three shows each time they went for a whole year, and I didn't find out until they were putting together gift baskets for forty five third graders in the physics lab getting ready for their final performance, each of which included a personalized tie-dyed T-shirt, all paid for by the science teamers. (I believe three of the four teams are doing multiple shows this year.)

It's a pretty cheap trick actually. (In fact, it doesn't cost the school a cent!) And I believe the science team makes a useful contribution to the community and should continue.

How many community college or even university ball players do you know that have people come up and ask for their autograph? Every year I have at least one student come in with that now familiar I'm - dying -to -tell -you something -you-won't- believe grin on their face. I even had some little girl come running up to me once in the grocery while I was picking out a loaf of bread. She just ran up and gave me a hug and grabbed my hand and drug me over to meet her mom. I had never met that little girl.

There is an energy between science teams and third graders that is surprising.

What do the teachers think? Here are some samples.

Ann Goree was the first teacher we visited and she has had a team every year since. I accompanied the first team in the fall. Thereafter they went alone. I divided them into 4 teams and had each get their own third grade teacher. Ann Goree had one of these new teams that spring, and has had a team every year since. She noticed a change in the chemistry.

Her words: Even though Mr. Nicholson or I may give a better expressed and more accurate explanation, the kids seemed to pay more attention and be more involved when it was just them and the college students.

Curious, I went to watch. From time to time I still go to watch. Every time I go I am still surprised by the reaction third graders have toward Science teamers. It's like some sort of violation of the law of conservation of energy.

You won't understand until you go watch.

Just about any science team will do. In twelve years, I've never had anything other than enthusiastic response from third grade teachers.

Here are two notes from teachers this year.

**Thank you so much for sending David and Jennifer to my class. They were absolutely wonderful.**

**I have pictures that I'll send as soon as possible. You would be proud of how they worked with the children.**

**Our principal wanted to get you to send more students. The third grade teachers need them, too! She asked me to give you her email. She loves SCIENCE!!!!!!**

**Hooray! Kim Smith-Principal, Stephens Elementary**

**Email: [kasmith@alex.k12.al.us](mailto:kasmith@alex.k12.al.us)**

**Please send David and Jennifer again. We loved them.**

**Thanks again!**

**Lucretia**

**From:** "Vicki Spraggins" <vspraggins@alex.k12.al.us>

**Date:** December 4, 2009 9:52:15 AM CST

**To:** <nnicholson@cacc.edu>

**Subject:** thanks

**Thank you so much for allowing the science team to come visit us this semester. The kids have learned so much from them. We have asked them to come back next semester, if at all possible. Will try to send pictures from today with the hovercraft later.**

**Vicki**

(Pictures of Science Team Activities are available here)

[http://caccphysics.cacc.cc.al.us/science\\_team/science\\_teams\\_in\\_picts.htm](http://caccphysics.cacc.cc.al.us/science_team/science_teams_in_picts.htm)

# The Science Team Proposal

## Introduction

I believe the science team is an effective teaching tool as well as a promotion gimmick, because it's not just a one act magic show, it is 10 times throughout the school year and it is activities the kids do, not just something they watch done. And I believe it also improves the conceptual understanding of physics for my students as well.

## Request

Eighteen (3 per school in my service area) Science Team scholarships of \$1000 each semester (\$2000 per school year per student.)

These scholarships are to be used either to buy books and supplies at the bookstore or for tuition or some combination thereof.

Both full time college students and dual enrollment high school students should be eligible for these scholarships.

These scholarships should be awarded in conjunction with any other scholarships the student may have.

## Requirements

Students receiving this scholarship must:

Be pursuing a degree in science, technology, engineering, or math

Enroll in a Physics sequence (either trig or cal based), or have taken physics at CACC

Take Physics 299 Directed Studies in Physics both semesters

(Phy 299 will be a required part of the course load for the physics instructor)

This will be a 1 hr course that meets for 1 hour twice a week. One day will be dedicated to planning and discussing activities.

The second day will be engaging in these activities with elementary or middle school students in local schools.

Engage in one science team activity each week (So they would adopt two third grade classes and visit each on alternate weeks.

Coach a Mini Lego Team for four weeks in the spring for grades 4 - 6 (Two hours two days a week.)

Coach a First Lego League for grades 6 - 8 for six weeks in the fall. (Two hours two days a week.)

## Comments

1. Dual enrollment is a terrific idea, but it is a rich kid game, since there are no kind of scholarships available for dual enrollment students in Alabama, and families of many of local high school students cannot afford to pay tuition & books. Extending this scholarship to dual enrollment students as well would open the opportunity of participating in the dual enrollment program for many who cannot otherwise afford it.
2. One cannot plant an apple seed and expect to harvest apples in a single season. Likewise, one cannot grow teenagers eager to do science and math in a single year. I believe we should plan for some kind of assessment of the effectiveness of this program by an external examiner after 3 years and again two years later.
3. If it is as successful as I expect it will be, we should form a plan to expand the program statewide.



# Appendix I

## The Whole Darn Thing

### Dropout statistics at a Glance

Adults who don't finish high school in the U.S. earn 65 percent of what people who have high school degrees make, according to a new report comparing industrialized nations. No other country had such a severe income gap.

The new report says 44 percent of adults without high school degrees in the United States have low incomes - that is, they make half of the country's median income or less.

Only Denmark had a higher proportion of dropouts with low incomes.

Adult education and job training do little to close gaps.

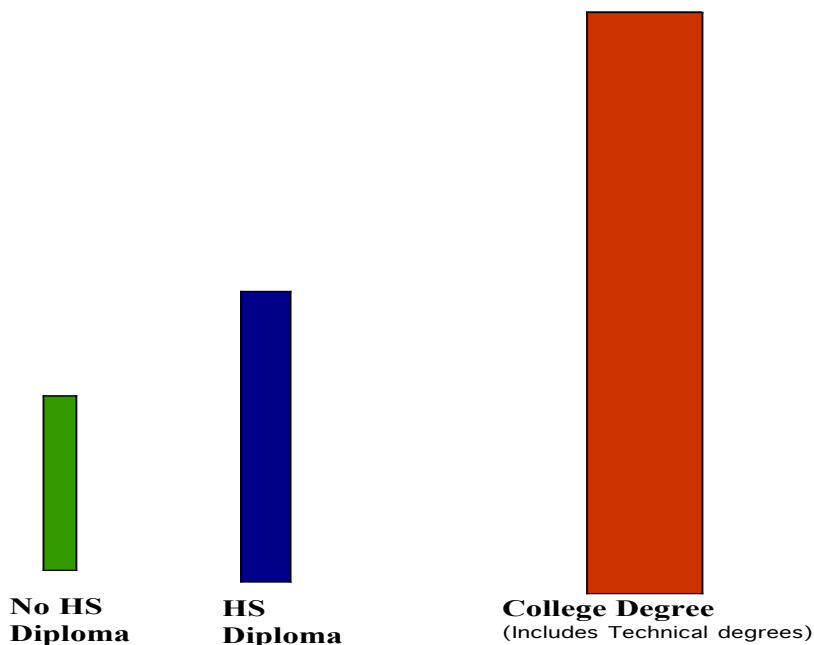
Those with poor initial qualifications remain disadvantaged throughout their life, because they have fewer opportunities to catch up later on.

Among adults age 25 to 34, the U.S. ranks 11th among nations in the share of its population that has finished high school.

**It used to be first.**

## The Short Version

**How the US treats people according to their education.  
(Worse than any other nation in the world besides Denmark)**



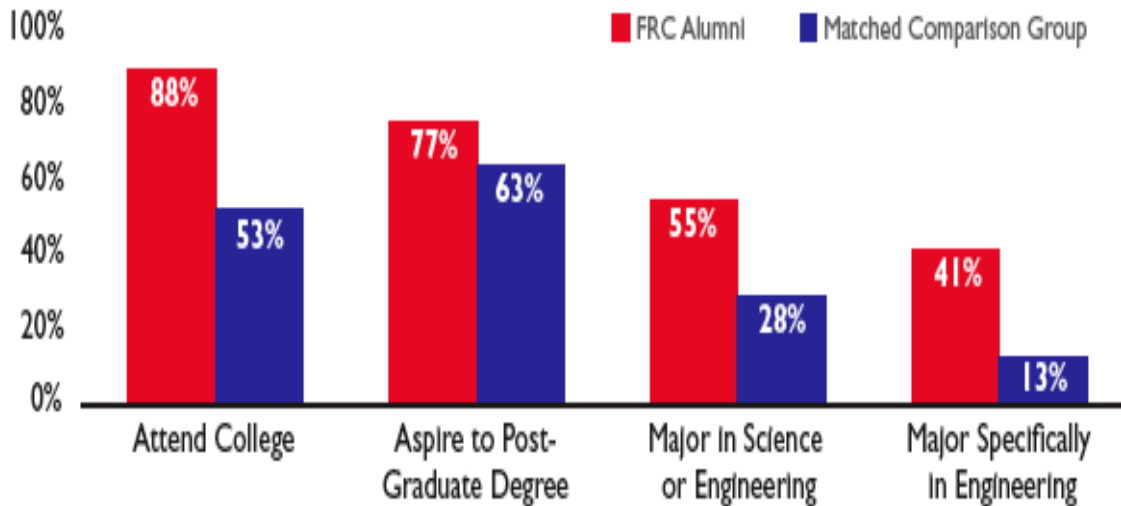
## Building Academic Achievement

Source: Brandeis University Impact

Evaluation, 2005

Compared to a group of students with similar backgrounds and achievement in high-school math and science, *FIRST* alumni are:

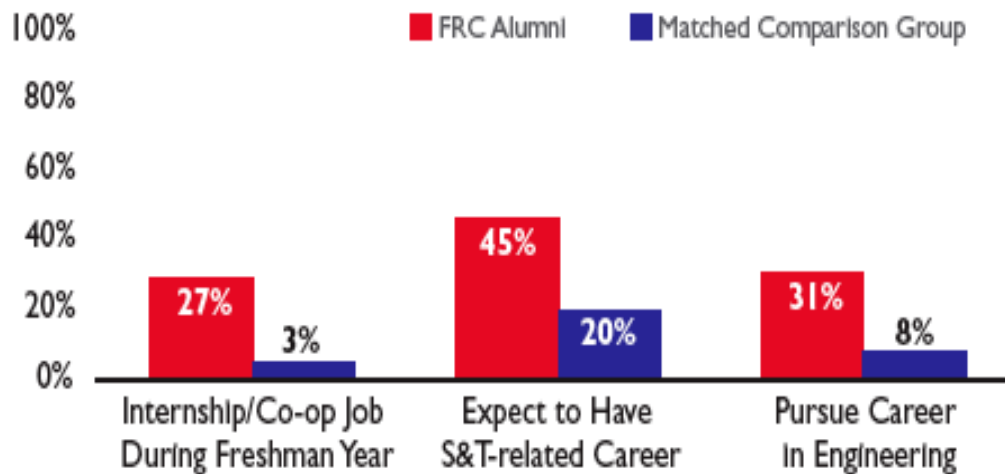
- » Significantly more likely to attend college
- » Twice as likely to major in science and engineering



## Enabling Careers in Science & Technology

**FIRST alumni are:**

- » 10 times as likely to have had an apprenticeship, internship, or co-op job in their college freshman year
- » More than twice as likely to expect to have a science or technology-related career after college



## Case Histories:

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» At Chatsworth High School in inner city Los Angeles, where 60% of students graduate and less than half go on to college, every *FIRST* participant graduated on time, attended college and many enrolled in Honors and Advanced Placement courses

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» At Joseph C. Wilson High in inner city Rochester, NY,

every *FIRST* team member has graduated.

Graduates have attended Cornell, Harvard, Penn State, Rensselaer Polytechnical Institute, Rochester Institute of Technology, Stanford, SUNY and Tufts

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» At Pennsylvania's William Penn High School, about 17% of students drop out, 50% do not attend college. Every *FIRST* participant has graduated and gone on to college or technical school.

The 01-02 team received more than \$250,000 in scholarships

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» Only one partnership has caused a fundamental change in both our institution and the young people it serves. FIRST has inspired and revitalized the Wilson teachers. The effect on our young people has been a profound one. Never in my long experience as a high school principal have students been so totally absorbed in a project.

Suzanne Johnston

Principal, Joseph C. Wilson Magnet High School, Rochester, NY