

# **Cape Fear High School**


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4762 Clinton Road Fayetteville, N.C. 28312 (910)483-0191

## S.S. Fincher Memorial Foundation Education Grant Proposal Application Cover Page

School Name: Cape Fear High School

School Address: 4762 Clinton Road, Fayetteville, NC 28312

Principal Name: V. Lee Spruill 

Contact Person: Jennifer Evans

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Project Name: Transforming to “Maker – Classrooms”

Date Submitted: 10-8-2014

Curriculum Areas: Science & Drafting/Engineering/Architecture

Total Amount Requested: \$5000.00

Brief Summary: Two teachers at Cape Fear High School would like to begin transforming their respective classrooms to “Maker” classrooms. The underlying theme to a “maker” classroom is enabling students to formulate ideas, build products, test them, fail, and then rebuild them for success. We would like to approach several topics in our curriculum using a “maker” component along with the typical presentation component. We would like to purchase a 3D printer to share between the Special Interest Science and the Drafting teachers at our school.

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October 7, 2014

To Whom It May Concern:

Over the past 4 years I have been the Science Olympiad coach at Cape Fear High. Throughout this time we have gone from a handful of participants to two full teams, a varsity team of 18 juniors and seniors and a junior varsity team of 18 freshmen and sophomores. Last year our varsity team placed 4<sup>th</sup> overall at the regional competition which qualified us to compete at the State Competition this past April. Two of our students placed in 2 events at states. Last year, due to the support from my principal, I was given the opportunity to teach a course called "Special Interest Science Honors". It was a small class of eight students. I used curriculum from The National Math & Science Initiative (NMSI), Science, Technology, Engineering, and Mathematics endeavor (STEM), and National Science Olympiad as a guide to teach the course. The students learned how automobile air bags work, they built and tested bottle rockets, gliders, & towers, they did independent research presentations and papers on famous scientists and our National Department of Energy Laboratories among other things. In addition, I am the director of the Cape Fear High School Academy of Natural Science. Over 100 students are enrolled in the program and take seven science classes (maintaining a 3.0 grade point average in them) before they graduate. Since we require those students to take seven science classes, we offer non-traditional honors level science courses such as: Astronomy, Geology, Marine Science, Zoology, and Special Interest Science. Both the Academy of Natural Science and the Science Olympiad programs are growing yearly.

This past spring while waiting for an appointment, I read an article about "Maker Classrooms" in an education journal. As I read the article, it occurred to me that I had a "maker classroom" already. I was using similar strategies as the teachers in the article. One thing they had that I didn't was a 3D printer. Two of the five strategic goals in Cumberland County Schools are (1) to use up-to-date technology systems and (2) to prepare students for work and further education opportunities. In a "maker" classroom, students are allowed time to brainstorm about a project, build it, test it, improve it, and rebuild it. These are vital skills for all of us. So often in the everyday classroom, our students get in to a routine of listening to a lecture, taking notes, reading the textbook, answering questions, and then taking a test. Rarely do we give our students a chance to "do" what we're teaching. They learn about it but have to imagine it, they don't build anything, much less re-build anything. I'm not under the naïve assumption that we can radically change all of our classrooms with a 3D printer, but we can enhance our approach to education as these machines become available to us. I want to learn about them now so I can provide my students with the opportunity to use them in my classes. Cape Fear's drafting teacher, Matt Hanes, and I will team up to learn how to use the 3D printer and do cross-curricular projects with our students.

In order to begin our Maker Classrooms Transformation we need to purchase a Large 3D Printer Model AW3D HD2X. This printer bundle will allow our students to print in 2 colors and with 2 different materials. This model comes with the filaments which are what we used to think of as "ink cartridges". Here are a few of the projects our students could use in the drafting classroom

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or science classroom: print out complex molecules to study such as the DNA double helix, print casts of rare fossils to analyze, print new architectural designs, and print out topographic or demographic map models.

Cumberland County Schools aim to inspire students to become lifelong learners by offering customized rigorous learning environments. The possibilities for incorporating the 3D printer into our curriculum are endless. The issue for Mr. Hanes and me will be to learn how to use the printer and safely and efficiently utilize the device with our students. My first goal will be to introduce my Special Interest Science students to the machine and get them to a certain comfort level with it. My ultimate goal will be to train my Special Interest Science students to share and introduce the device to other science teachers and assist their classes as lab assistants. Can you imagine . . . first year Biology students printing a model of a cell with all of its organelles in the classroom instead of just drawing it out or perhaps color-coding a diagram? Mr. Hanes' Drafting/Engineering classes use a Computer Aided Drafting (CAD) software which allows the students to design projects such as scaled buildings, bridges, etc... His students will use the 3D printer to actually manufacture the items they design using the software. The purchase of the 3D printer will be a "win win" for both of us, our classes, and ultimately both departments (Drafting and Science).

While chatting with a colleague the other day, she informed me of a family friend who purchased a 3-d printer for his office. She remarked that the 3D printer was making more money for the family friend than his actual business. This intrigued me because one of my main goals in the classroom is to break down the barriers between students and equipment. The only tool most of my chemistry, environmental science, geology, and special interest science students know how to use is their smart phone. Honestly, this year I've already had to show two students how to use a screw driver and pliers. Although as a youngster I did have the opportunity to use screw drivers, pliers, wrenches, and hammers while working on projects with my father, I was still intimidated when I stepped into the labs at NC State as a freshman biochemistry major. I don't want my students to be intimidated when they enter a college laboratory. Of course, they need to respect the equipment but not to the point that they're scared to use it. I believe if I can expose my students to one of the most innovative devices available, a 3D printer, they will gain the confidence necessary to be successful in lab situations as they move to the next level of their education. In fact, the opportunity to use the 3-d printer may motivate one of my students to pursue a career in technology or perhaps engineering. This is another goal of Cumberland County Schools, to provide exciting opportunities for career exploration.

To measure the success of the 3D printer and Maker Classroom Transformations, Mr. Hanes and I will track our students as they move on to other classes and/or college. With Edmodo.com, we can maintain communication with students in our classes even when the semester ends. I intend to continue working with the underclassmen in my Special Interest Science class. Their level of success as lab assistants for other science teachers will provide feedback for this project. I can use the 3D printer with the eight students in my Special Interest Science class this semester and the eight enrolled in the course next semester. Moreover, Mr. Hanes will use the 3D printer with his Drafting/Engineering and Drafting/Architecture students both semesters, which means he can

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use the device with approximately 60 students per semester. My students could potentially use the device with other science teachers and their classes. We have 10 science teachers at my school, therefore at least 250 additional science students could see the device in their classes both semesters too. This year, alone, my 16 Special Interest Science Honors students, the 36 Science Olympiad team members, and Mr. Hanes' 120 drafting students will get to use or be involved with a project using the 3D printer. This is definitely an item that will be used more and more as we learn the potential of the machine's applications in the classroom. This will be the school's first 3D printer and it will be used for years to come.

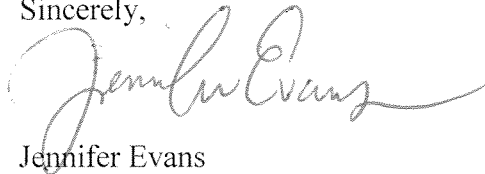
Vendor: Airwolf 3D  
130 McCormick, Suite 105  
Costa Mesa, CA 92626  
949-478-2933 (office phone)  
[eva@airwolf3d.com](mailto:eva@airwolf3d.com) (sales contact)

Quantity	Produce Description	Unit Cost	Total Price
1	Large 3D Printer Model AW3D HD2x	\$3995.00	\$3995.00
10	Platinum Series ABS Filament (various colors)	\$48.00	\$480.00
		Shipping	\$450.00
		NC Tax	\$300.00
		Total	\$5225.00

I realize our line item budget is \$225.00 over the allowed amount for this grant. I will request the difference from our principal, Mr. Spruill. In the past, he has been quite willing to assist in funding when the budget exceeds the allowed grant amount by less than \$250.00. Mr. Spruill did sign the cover page indicating his approval of this grant proposal.

Thank you for considering this grant proposal. I am a 21-year veteran teacher and every year becomes more challenging. I thoroughly enjoy teaching but definitely realize the importance of keeping up with technology and using it appropriately in the classroom.

Sincerely,



Jennifer Evans  
Cape Fear High School Science Department, Chairperson  
Science Olympiad, Coach  
Academy of Natural Science, Director