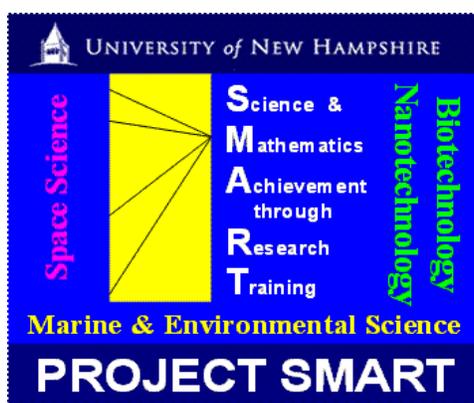




# Project SMART Summer Institute

## July 2 – July 27, 2012

### FINAL REPORT



[www.smart.unh.edu](http://www.smart.unh.edu)



**Subhash C. Minocha, Director**  
**Professor of Plant Biology and Genetics**

## **PART I – GENERAL**

Project SMART (Science and Mathematics Achievement through Research Training – [www.smart.unh.edu](http://www.smart.unh.edu)) Summer Institute just finished the 21<sup>st</sup> year at the University of New Hampshire. The program is aimed at challenging, educating, and motivating talented high school students in science and mathematics while acquainting them with the environment and resources of the University as a place for higher education and research. The program is open to high school students who are upcoming juniors and seniors. The program participants study advanced topics in science, mathematics and computers through lectures, demonstrations, hands-on laboratory experience, and field trips, and learn how to do research with UNH faculty and graduate students. Three modules, i.e. Biotechnology & Nanotechnology, Marine & Environmental Science, and Space Science were offered in 2012. The Summer Institute always emphasizes the interdisciplinary nature of the various scientific fields and how math and computers converge with scientific research. The students also study and discuss the applications and implications (economic, social, environmental, legal, ethical and moral) of the scientific advancements in each of these fields to society.

Project SMART Summer Institute was started in 1991 at the initiative of Senator Judd Gregg (as Governor of NH) and UNH President Dr. Dale Nitzschke. On its 20<sup>th</sup> anniversary, Senator Gregg sent a personal letter of appreciation to us through one of his staff members. This year, we received felicitations from Senator Jeanne Shaheen congratulating the students for their demonstration of excitement for STEM education. Over the years, the program has received enthusiastic support from each of the past presidents, provosts and the Deans of COLSA and CEPS. The program has gradually evolved from having all participants from New Hampshire (at no cost to them) during the first few years into a regional, and now into a national/international program (see timeline history at: <http://colsa.unh.edu/article/spring-2012/get-smart>). During the past five years, special efforts were made to increase the number as well as the diversity of participants. As a result, in 2012, with support from the Liberty Mutual Foundation, the Summer Search Organization, NH EPSCoR, Delfigo Security ([www.delfigosecurity.com](http://www.delfigosecurity.com)), and the USDA Forest Service, and in collaboration with the Anatolia College in Thessaloniki (Greece), the Kultur University, Istanbul (Turkey), and now the King's Academy, Amman (Jordan), SMART has brought together aspiring young scientists from rural and urban districts of New England, from across the US, and from Greece Turkey, Jordan and Canada and India, to live together and learn to do science in the rural environment of UNH. This year's group followed the tradition of being highly diverse, including a significant proportion of students from underrepresented, economically disadvantaged, and inner-city environs within the US.

During the past few years, we have established partnerships with several organizations in the US and abroad that have access to diverse student populations (ethnic, racial, under-represented groups, and international); this partnership is expected to grow even further *to achieve the greatest diversity of student participants possible*. With this, we also expect to increase our enrollment to 60 students next year (perhaps more in the future if we can add a new module on Energy Sciences).

The summer institute was a unique opportunity for faculty and scientists from CEPS, COLSA and EOS (all UNH), the US Forest Service, and the Harvard Forest as well as other invited guest speakers to reach out to high school students at an age when they make serious decisions about higher education and career choices to solidify their interest in science, math and

technology. In addition to learning/doing science, the students gained a greater appreciation for careers associated with the various sciences and established friendships with their peers, and mentoring relationships with the UNH faculty. Several are expected to apply to UNH.

### **Unique Features/Achievements of Project SMART-2012:**

- The group of student participants was highly talented and came from among the best available and those who had already shown interest and aptitude in sciences.
- The group was highly diverse (see attachment 1), and included a significant proportion of students from minority, underrepresented, economically disadvantaged, and rural as well as inner-city environs within the US. The group included an equal number of males and females. For the first time, we had students from Jordan and Canada; this allowed a very healthy social interaction and networking among the peers.
- Most of the students stayed on campus for the weekends; the field trips and weekend programs included visits to New England Aquarium, Boston Museum of Science, the top of Mt. Washington by Cog railway, The Isles of Shoals, whale-watching trip to the ocean, the Harvard Experimental Forest, the local malls, the movies, and the Hill Top Fun Center, which also enhanced social interaction among the students and the UNH staff.
- On the final day, everyone presented a scientific poster at a three-hour long session in the atrium of Morse Hall, which was attended by more than 200 students, faculty, teachers, parents and UNH administrators. Also present were representatives from the Liberty Mutual Foundation and US Senator Jeanne Shaheen's office; the latter sent a personal congratulatory note to the students and the program staff for 20 years of success.
- The Space Science students had a record-breaking balloon launch, reaching heights of ~110,000 ft (>20 miles) into space; this event **received significant nation-wide media exposure as evidenced by the stories listed under News:**

We hope to enter a new era in Project SMART Summer Institute 2013, which will again include the same modules (perhaps with a special lecture series on Energy Sciences to prepare for launching a module with that title in 2014) but will bring in a larger (about 60) and more diverse group of students. Additional efforts will be made to seek outside funds for invited speakers, student support and recruitment of minorities and under-represented groups. Project SMART 2013 will let us showcase UNH as a great place to pursue college education and study science in our rural setting of Durham, NH.

**Visit [www.smart.unh.edu](http://www.smart.unh.edu) for picture galleries.** For more information, please contact: Subhash C. Minocha, Professor of Plant Biology and Genetics.

### **Program partners**

University of New Hampshire (UNH) - Provost's office - College of Engineering and Physical Sciences - College of Life Sciences and Agriculture - Space Grant Consortium - Center for High-rate Nanomanufacturing - NH NSF EPSCoR

USDA Forest Service

Liberty Mutual Foundation

Delfigo Security Inc.

Summer Search Organization ([www.summersearch.org](http://www.summersearch.org))

Several Biotechnology companies

**Project SMART-2012 in the News**  
**Summarized by Beth Potier – July 23, 2012 (Many more since then)**

**UNH News:** <http://www.unh.edu/news/releases/2012/jul/ds17balloon.cfm>

**Boston Globe:** <http://www.bostonglobe.com/metro/2012/07/22/teens-unh-program-launch-simulated-satellite/XxSgFuiizlPfnNj7eIacrK/story.html>

**MSNBC:** [http://www.msnbc.msn.com/id/46209853/ns/technology\\_and\\_science-space/](http://www.msnbc.msn.com/id/46209853/ns/technology_and_science-space/)

**NBC News:** [http://photoblog.nbcnews.com/\\_news/2012/07/27/12996558-a-rise-and-fall-thats-out-of-this-world?lite](http://photoblog.nbcnews.com/_news/2012/07/27/12996558-a-rise-and-fall-thats-out-of-this-world?lite)

**Blogs:**<http://ct.moreover.com/ct?haid=a0748933f69f6cd81342896395614aa6364b9919e4a24&co=f000000000432s-1158206718>

**WSBTV:** <http://www.wsbradio.com/ap/ap/education/teens-in-unh-program-launch-simulated-satellite/nPzcB/>

**Internet:** <http://www.beaumontenterprise.com/news/article/Teens-in-UNH-program-launch-simulated-satellite-3724670.php>

**News Boston.com Internet:**

[http://www.boston.com/news/education/articles/2012/07/21/teens\\_in\\_unh\\_program\\_launch\\_simulated\\_satellite/](http://www.boston.com/news/education/articles/2012/07/21/teens_in_unh_program_launch_simulated_satellite/)

**Republic print Internet:**

<http://www.therepublic.com/view/story/74acc6cca5f3472e9e3e6f8746a60b3b/NH--Space-Balloon>

**NECN Broadcast:** [http://www.necn.com/07/21/12/Teens-in-UNH-program-launch-simulated-sa/landing\\_scitech.html?&apID=74acc6cca5f3472e9e3e6f8746a60b3b](http://www.necn.com/07/21/12/Teens-in-UNH-program-launch-simulated-sa/landing_scitech.html?&apID=74acc6cca5f3472e9e3e6f8746a60b3b)

**Times Union - Online Print Version:** <http://www.timesunion.com/news/article/Teens-in-UNH-program-launch-simulated-satellite-3724670.php>

**Oklahoman Online Print:** <http://newsok.com/teens-in-unh-program-launch-simulated-satellite/article/feed/406705>

**Connecticut Post:** <http://www.ctpost.com/news/article/Teens-in-UNH-program-launch-simulated-satellite-3724670.php>

**Greater Media Newspapers:** <http://washingtonexaminer.com/teens-in-unh-program-launch-simulated-satellite/article/feed/2014360>

**Foster's Daily Democrat:**

<http://fosters.com/apps/pbcs.dll/article?AID=/20120721/AP02/307219990&Template=printart>

**YouTube:** <http://www.youtube.com/watch?v=IM7svBzG1kU>

**Sant Bani School News:** <http://www.santbanischool.org/news/2012/09/27/sbs-senior-takes-science-to-new-heights/>

## Numerical Summary of Project SMART-2012

### Summary of applicants:

**Total:** 60

**Attended:** 40

Biotechnology & Nanotechnology = 20

Marine & Environmental Science = 16

Space Science = 4

NH = 16 CA = 7 MA = 5 NY = 3 NJ = 2 CT = 2 Canada = 1 Jordan = 1

Other states – GA, IL, ME, AK, (1 each) - Male = 20 Female = 20

**For more information, contact:** Subhash C. Minocha, Professor of Plant Biology & Genetics  
[www.smart.unh.edu](http://www.smart.unh.edu)

**Project SMART-2012**  
**Excerpts from Reflections of Teaching Assistants**

The Project SMART 2012 program, overall, was an excellent opportunity for everyone involved to explore various areas of science and make connections that can last a lifetime. From day one, the students were instantly submersed in a level of learning far beyond any I had experienced. It was truly amazing to see how fast the students could actually grasp and apply information that they had been exposed to for the first time. Academically, this was an extremely unique program. We spent very little time in lectures. I would definitely say the Project SMART reinforced my desire to continue exploring this (*teaching*) occupation.

**Julie Cupido** – *Noyce Summer Fellow – TA Marine and Environmental Science*

Project SMART attracted curious and driven young adults, and it was fun to work with them. While they come from many different backgrounds – religion, race, and economic status – they all have one thing in common: supportive parents. It was clear that their families value higher education, evident by their participation in the program. Many of the students had dreams of attending selective colleges and universities around the country, and knew only hard work would get them there. They were all willing to learn and challenge themselves with questions. I truly enjoy working with other people and seeing them flourish, and Project SMART was a great introduction.

**Margot Popecki** – *Noyce Summer Fellow – TA Biotechnology and Nanotechnology*

Looking back on this past summer, I don't know if I can express how grateful I am that I was chosen as a Noyce Scholar to participate in Project SMART as a TA. The environment of Project SMART made it so easy to learn such large amounts of information while having fun. The time in which I saw the most excitement and passion from the students, was the posters that they prepared and presented on the final day. . . ., there was a great amount of knowledge and pride that was demonstrated. Another thing that I took out of this experience is the variety of teaching and learning styles are used in Project SMART. Overall, Project SMART is an extremely worthwhile program for everyone involved. The students are able to unite from all over because of their love for science, the teachers are able to teach material that they are truly passionate about, and the TAs such as myself are able to witness and learn from the interaction between the two.

**Kelsey Quinn** – *Noyce Summer Fellow- TA Biotechnology and Nanotechnology*

This past summer I worked as a teaching assistant for the biotechnology/nanotechnology module of Project SMART. This summer internship gave me the opportunity to continue my involvement with a program that I attended myself as a rising junior in high school. What I believe makes Project SMART special is the bonds and friendships that the students form. The only downside to the weekend field trips is that I think the students would have appreciated an opportunity to catch up on some sleep. Overall I had a great time working with Project SMART this summer. By far my favorite portion of the program is helping with the students with their final poster projects and getting to see how proud they are when presenting them.

**Sabrina Lynch** – *Project SMART 2009- TA Biotechnology and Nanotechnology*

## **Project SMART-2012**

### **Selected reflections from students**

"Before Project SMART, I already spoke some biology. But at UNH, I learned about the coupling of knowledge and creativity to create truly innovative ideas. ...And the amazing part is — I knew every biology vocabulary involved in this idea; there's nothing new: DNA, primers, Taq polymerase, PCR, promoters, replications... I *know* those concepts from class. But there were *just* concept, and someone was able to creatively string them together into such a marvelous idea. That inspired me. Coming from an underprivileged background, I often doubt whether I will accomplish anything great in life. But Project SMART reaffirmed my confidence. UNH reassured me that despite my challenges, I will accomplish something great.

And there's a certain beauty to a residential program: I met a lot of friends there whom I still talk to. It was my first time getting to know so many people from the East Coast (I'm from San Francisco). In addition to revealing science, Project SMART has showed me the other side of the country. I will never forget the meaningful diversity."

**--Ching Li, B&N, Galileo Academy of Science and Technology, San Francisco, CA**

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I had a great time at Project SMART and I had a lot of fun and learned a lot. Some great memories in my mind were the trip to Appledore... especially seeing the seals and walking around the island to test pools; hearing about Amanda Merby's research and feeling like we were helping her by taking samples and collecting snails for her; the final intense work on the poster presentations where we were all tired but having fun and proud of our final work; outside the class memories of volleyball next to the dorm, the final night movie and snack buffet.

**--Rebecca Migotsky, M&E, Home School, Jaffrey, NH**

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I would first off like to say that Project SMART was one of the best decisions I could have made for myself. I not only had an overall amazing time, but I learned a lot and made many friends as well. It is something that I would definitely recommend to others. I believe that the program was well run. One thing I noticed and got joy from was that all the professors were passionate in their teachings. While staying at UNH I felt more like a college student than a high school student. It really opened my eyes to how life without parents will be like. I am keeping in touch with many of the Project SMART kids (via Facebook).

**--Renee Lagarenne, M&E, Cold Spring Harbor High, NY**

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Applying to Project SMART was the best decision I made this summer, and because of it I had a far more productive summer than I otherwise would have. Who other than "Smarties" can say that they learned about some of the most current and fastest growing scientific fields from the very scientists who research and develop them, got a taste of campus life, cemented their first choice for college and made best friends along the way? This knowledge will help me for the rest of my life, regardless of my field of study, because it is these same fields which will define the future. The program even allowed me to confirm that UNH was the school for me, something which will be invaluable in the impending application process. Perhaps the most valuable thing

about Project SMART however, was the friends that were made. In four weeks I met some of the most interesting people and made some of the best friends of my life. I am in touch with almost everyone from the program in some way, and communicate with some every day. With new friends, experiences, and ideas, Project SMART made this summer the best of my life.

**--Colman Wimsatt, B&N, Concord High, NH**

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At school, I had only scratched the surface of the many things of which we discussed during lectures and discussions in Project SMART. Ranging anywhere from the process of DNA replication to the ethical issues surrounding cloning, I was introduced to a topic I had never explored before: nanotechnology. Not only was Project SMART an opportunity to expand my scientific knowledge, but I also made friends that I intend to keep for a long time to come. Although I arrived at Project SMART not entirely knowing what to expect, I left with even more curiosity about the wonders of biotechnology and with friends that will last more than just my stay at UNH.

**--Emily Partner, Lawrenceville School, NJ**

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The experience I had at Project SMART UNH was one that I will always remember and cherish. It was well packed with exciting and educational activities which always kept us students busy, entertained and challenged. Our classes were led by excellent professors, who gave intuitive lectures, organized labs, and great guidance through our research projects. We also had other professionals such as urban foresters come and teach us about what is currently happening in their field. Not only was Project SMART a great learning center, but it was filled with students who all had a common goal to nurture their love of science. All the students I met, I genuinely enjoyed and am keeping in touch with the majority of them.

**--Athena Rose Jennings, M&E, Kings Academy, Jordan**

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My time at the University of New Hampshire, was (and I think the other Project SMART alumni would agree with me) too short considering all the wonderful, memorable experiences I had there. The professors were all very engaging and easy to approach, providing an excellent learning environment. It was an interesting and terrific experience to be surrounded by students who were focused and passionate about what they were studying. Project SMART exceeded my expectations and my participation in it will be something I will look back at fondly down the road. I had made many great friends (some of whom I am still in contact with) and felt much more prepared for college life - both the social and academic aspects - at the conclusion of Project SMART.

**--Nicholas Paz, M&E, De La Salle High School, Concord, CA**

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I think that the most important thing that Project SMART has done for me is to help me realize what I like doing. Project SMART truly is a perfect combination of everything. Whether it's how almost every lecture is combined with a lab that supplements it, or how lectures are combined with real-life demonstrations in nearby facilities, or how the traditional lectures are combined

with discussions, or how the academic environment is combined with bonding with people from across the country, Project SMART is such a well-rounded program!

*I still can't thank you enough for making this program possible... I can say without a doubt that July has not only been the best month of the summer, but because of Project SMART, 2012 summer has been my best summer of my life. The material was super interesting, the students there were amazing, the professors were thought-provoking, and the memories will be unforgettable. Compiling the poster was one of my favorite parts of the program and it was really rewarding.*

**--Angela Kong**, Lynbrook High School, San Jose, CA

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Project SMART was amazing...it was a perfect balance of fun and learning. It was an experience of a lifetime and really opened my eyes to the issue of cyanobacteria which I'm now very interested in. This program was the deciding factor to continue on a path to become an environmental engineer. I wouldn't trade the experience for the world. The people were great, the professors were outstanding, and everything was organized and planned out. I especially appreciate the fact that my experience was funded. I wouldn't have been able to have this experience without the help of other generous people. I'm proud to say that I was a part of Project SMART.

**--Sydney Weiss**, M&E, New Trier Township High, Winnetka, IL

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During this program I had the privilege of spending a month of my summer with professors and students alike in the scientific community. I have to admit I had a particular fondness for nanotech going in to the program, but found myself equally enraptured with the biotech aspect of the program by the month's end. I have kept in touch with a few of the students, and plan to fly out and visit one next spring. Meeting other students as passionate about academics as I am was a treat.

**-Eva Murray**, B&N, Pinkerton Academy, NH

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My Project SMART experience was certainly an amazing one. My fondest memory is the launching and recovery of the high altitude balloon. Not only was it a fun experience, but it was one that was educationally rewarding and highly inspiring to my future. In fact, I have already taken what I've learned and will be applying it in an independent study at my school this year, where I will launch a high altitude balloon of my own. Aside from the balloon launch, Project SMART was excellent all around. Fellow students were kind and courteous and all had a desire to really learn. I've been keeping in touch with many of them via phone, e-mail and social networks since Project SMART has ended.

**--Andrew Mahn**, SS, San Bani High School, Sanbornton, NH

Also see comments on College Confidential: <http://talk.collegeconfidential.com/summer-programs/760662-summer-programs-unh-project-smart.html>