

**MET/Penn State Nanotech Camp Program**  
**Student Tracking & Assessment: Years 2001 to 2005**



Prepared for: The Penn State Center for Nanotechnology Education and Utilization

By: Management and Environmental Technologies, Inc.

Date : April 16, 2006

## TABLE of CONTENTS

Report Background.....	3
Student Tracking.....	5
Results.....	6
Recommendations.....	8

## ATTACHMENTS

Program Reports: Years 2001 to 2005 .....	TABS 1 thru 5
Best Practices Presentation, Year 2003 .....	TAB 6
Newspaper Articles .....	TAB 7
Nanotech Camp Photographs on CD-ROM .....	TAB 8

# Penn State University Nanotech Camp Report

## Student Tracking & Assessment

### 2001 - 2005

## REPORT BACKGROUND

The Nanotech Summer Camp is sponsored by Penn State University's Center for Nanotechnology Education and Utilization (CNEU). Management and Environmental Technologies, Inc. (MET) has been subcontracted to provide outreach, orientations, student enrollment, community based organization and institution co-sponsor collaboration, project management and follow-up.



Founded in 2005, the nonprofit tax exempt organization Technology Opportunities in Communities of Promise, Inc. (TOCP) was established to sustain and act as a catalyst for youth in their education, career and employment interest pertaining to science, technology, engineering and math. Coupled with academic support and guidance, TOCP provides life skills, workforce, and cultural diversity exposure in the form of college tours, service learning experiences, and compatible student internships.

The Nanotech Summer Camp sponsored by Pennsylvania State University's CNEU is funded through the National Science Foundation. MET's mission is to identify deserving students located in underserved Pennsylvania communities. This urban initiative is a collaborative effort driven by Penn State's CNEU, MET, Inc., secondary educational institutions, faith based, and community based organizations.

The Nanotech Summer Camps are experiences where students are immersed in a 3-day camp overnight stay on the grounds of PSU's Main Campus in University Park, PA. Local institutions and agencies participate as co-sponsors and work with MET, Inc. to attract appropriate students and chaperons. During the Camp training, graduate students and primary instructors work in labs and classrooms focusing on nanotechnology, nanofabrication, career opportunities, educational pathways and provide exposure and mentoring relative to postsecondary education campus life. The purpose of the CNEU camp is to:

- Support nanotechnology awareness in K-12 education
- Expose participants to careers in nanotechnology
- Develop, expand and strengthen career support systems
- Provide educational & cultural exposure
- Provide a cutting edge technology experience
- Experience mentoring and coaching opportunities

- Learn about basic nanofabrication applications, tools, and processes via hands on experiments
- Learn about applications in nanoelectronics, nanobiotechnology, and other relevant fields
- Learn about fabrication and characterization techniques
- Provide lots of external education practice time
- Have fun

Students attend presentations and demonstrations, and participate in hands-on experiments where they learn about nanofabrication applications and processes, including microelectronics, biotechnology, lithography, plasma etching, thermal modification of materials and physical and chemical vapor deposition.



They are also exposed to life on a college campus. Ask students about their favorite experiments and 95% will say that it was learning to make ice cream using liquid nitrogen. (See TalkBack data results in the attached yearly program reports).

The tables below show the number of MET/TOCP participants in the Camp from 2001 to 2005 by location, participating schools and organizations. The included photos demonstrate the hands-on interactive character of the program substantially enhanced in years 2004 and 2005.

### TOCP/PennState Nanotech Camp Program Statistics, Years 2001 to 2005

Nanotech Camp Participants per Program Year	
Program Year	No. of Participants
2001	17
2002	73
2003	62
2004	44
2005	40
TOTAL	236

<b>Participating Schools &amp; Organizations: Year 2001 to 2005</b>		
<b>City</b>	<b>Participating Schools</b>	<b>Participating Organizations</b>
Philadelphia	Cardinal Dougherty H.S.	Boys & Girls Club of Phila
	Carver H.S. of Eng'g & Science	Hickman Temple AME Ch.
	Central High School	
	Delaware Valley Charter School	
	Girls H.S.	
	Howard Vocational Technical Sch.	
	John Dickinson H.S.	
	Lincoln H.S. of Fine & Performing Arts	
	Phila H.S for Creative & Performing Arts	
	Simon Gratz H.S.	
St. Martin H.S.		
	University City H.S.	

<b>Participating Schools &amp; Organizations: Year 2001 to 2005 (Continued)</b>		
	Henry Lea Middle School	
	Mayer Sulzberger Middle School	
Harrisburg	Harrisburg H.S.	Greater Harrisburg NAACP
	Rowland H.S.	
	SciTech H.S.	
	C.D. East Junior High School	
	Swatara Junior High School	
Pittsburg/Wilkinsburg	City H.S.	Community Leadership Development Institute
	Wilkinsburg H.S.	Healthy Start
	Woodland Hills H.S.	Hosanna House

The Camp has evolved since its inception in 2001 with expansion and improvements occurring under the guidance of MET's staff and the PSU/CNEU team. Each year both MET and PSU collect student evaluations of the Camp. Mr. Dunkley compiles and analyzes the MET data and creates reports of his findings. (See the TABS: Program Reports: Years 2001 to 2005).

In October 2003, MET proposed program improvements with suggestions for future programs based upon the observations of the camps by MET's staff and analysis of the student evaluations. (See the TAB: Best Practices Presentation: Year 2003).

## STUDENT TRACKING

In October 2005, MET commenced a student tracking effort to learn what Nanotech Camp participants from the 2001 to 2005 camps thought of their experiences during the 3-day Camp and where they pursued math, science and technology related education/careers as a course of study.



A representative sampling of students from the 2002, 2003, 2004, and 2005 camps were surveyed. Research efforts included:

- Creation of a master list of Nanotech Camp students and review of PSU spreadsheet
- Creation of a survey form to gather feedback from students
- Creation of a telephone script for program participants to make introductory calls to parents/guardians of minor students.
- Telephone interviews were conducted with 23 students
- Face-to-face interview was conducted with 2 students
- Collection of reports and records that were prepared by MET and CNEU.

This report is representative but not exhaustive. Conversations with students from Camps prior to 2004 proved futile due to the amount of time that had elapsed. Students had difficulty recalling specific experiences.

### Demographics of Survey Participants

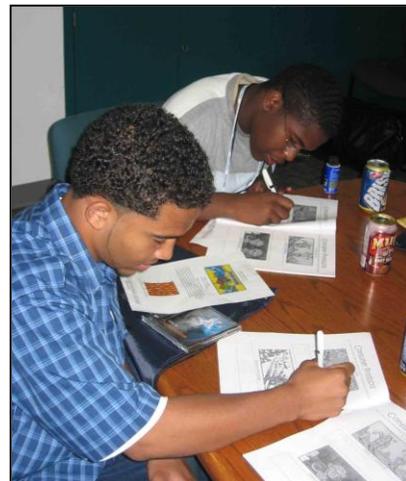
Participating Year	Number of Students Surveyed
2002	2
2003	4
2004	6
2005	15

\*Two Students participated in the Camp 2 years in a row.

Current Grade or Status at Time of Survey	Number of Students
10	2
11	11
12	6
College Enrollment Pending	1
College Freshman	3
College Sophomore	1
High School Drop-Out	1



High Schools Represented in Survey	Number of Students
Sci Tech HS	2
Simon Gratz HS	4
McKeesport HS	2
George Washington Carver	5
Schenley HS	1
Woodland Hills HS	1
Springfield HS	1
Dover HS	1
High School of Science & Engr.	2
Wilkinsburg HS	1
Dickinson HS	1
Edward Bok HS	1
William Penn HS	1
Howard HS of Technology	1
McKean HS	1



## SURVEY RESULTS

- 48% of respondents stated they are interested in careers in math, science or technology.
- 5 respondents graduated from high school in June 2005. Of the 5, 1 attends Community College of Philadelphia (CCP); 2 are in a 4-yr college of which Penn State is one; 1 will be enrolling in CCP in Summer 2006; 1 is working at a fast food restaurant with no concrete postsecondary plans.
- 1 respondent dropped out of high school in the 10th grade.
- 96% stated rated the camp experience as satisfied or better.
- Very few students (20%) were able to apply what they learned at camp when they returned to the classroom. Areas in which students applied what they learned included robotics, physics and proper use of a microscope.
- 76% of respondents were interested in science and technology before attending the camp.
- Overwhelmingly 96% of students said that they would recommend the camp to other students. Most talked about the opportunity to learn something new that they would not have had an opportunity to learn. They cited the following reasons:
  - Good experience to go to college campus and learn about things that are helpful for the future
  - To learn about life on a college campus



- Would like to return; learned a lot
- Get away from your current surroundings and learn things that you didn't know before
- Get to experience college life and learn about different components of nanotechnology.
- It was a good experience. Taught you more about science.
- It was fun
- Students can use the experience to know how it is on campus and prepare them for college
- It was fun. Learn about life on campus
- Camp was fun. Meet different people and learn about nanotech which they've never learned about before
- The camp is a chance to get into a lab that they probably won't be able to get into in school and the camp is on a beautiful camp with great food.
- Has been telling others about the camp. It is a good experience to learn about nanotech and to experience a college campus
- The Camp will blow your mind



Many institutions have undertaken numerous efforts to motivate students to pursue a college education. These initiatives typically focus on increasing awareness of college using promotional activities including brochures, posters, college fairs and workshops. A study conducted by Communication Works in 2002 found that these initiatives had little impact on increasing college-going rates of disadvantaged populations.<sup>1</sup> According to the study, despite the widespread use of these initiatives and their strengths, they remained significant gaps that limit their impact.

---

<sup>1</sup> *Capturing the College Potential of Students from Under-Served Populations,*” by CommunicationsWorks, LLC. Prepared for Pathways to College Network, November 2002.

The study concludes that “if we are to increase substantially the numbers of under-served students preparing for and succeeding in college, we must shift our focus of promoting college opportunities from simply increasing awareness of post secondary education to changing behavior related to college-going.” This is an area where the Nanotech Camp excels. Students are introduced to college through experiential activities that immediately target behavior change:

- Interactive MET/TOCP orientation sessions present the Nanotech Camp program’s goals, content, and expectations
- Upon Camp arrival students step off the bus into a breathtaking GPS driven scavenger hunt and nano-quiz.
- They participate in hands-on laboratory activities appearing indistinguishable in their clean room bunny suits from real Penn State students and scientists
- They participate in two nano-product development & marketing workshops where each student has to stand and deliver a talk around a nano product
- They join the on-campus cafeteria line and eat alongside PSU students
- They sleep in student dormitories, play student sports, and follow campus rules

The study further concludes that efforts must target not only students of families but also teachers, counselors, policymakers, and others whose actions directly affect students’ likelihood of attending college. It is here that the Nanotech Camp has an opportunity to increase its impact.



Three days of fast paced activity may be not sufficient time to influence students to:

1. Decide on Nanotechnology as a career field, or to
2. Attend/appreciate the benefits of postsecondary education, if in doubt, or to
3. Select Penn State and partnership institutions as their college of choice.

Clearly this program represents a significant advantage for STEM interested students. Connecting with families and teachers will have a greater impact on the outcomes of the 3-day Camp and in all likelihood will influence the students’ college-going behaviors and their decision to pursue a career in science, technology, engineering and/or math.

## **RECOMMENDATIONS**

I. The following recommendations are in the process of implementation

1. Select partner schools with a strong science curriculum.
  - Partnerships have been established with Poly Sci High School - Harrisburg, Carver High School of Math, Science and Technology – Philadelphia, Wilkinsburg School District and Hosanna House in Pittsburgh.

- Hosanna House is developing curriculum to be integrated into the classrooms.
  - Poly Sci is coordinating recruitment, chaperones and transportation for Nanotech Camp 2006.
  - Philadelphia School District and MET are now school outreach partners
2. Recruit mostly 10th and 11th grade students who are interested in math, science and technology and have a 2.0 grade average.
  3. Recruit and train high school students to assist in the Camp. These assistants should be past program participants, interested in college, and have declared a major in math, science or technology.

## **II. Other recommendations include:**

- Strengthen professional development conference invitation offerings and outreach to Nanotech secondary education participating teachers/chaperons. Ensure their access to earning professional development credits.
- Encourage partner schools to have “Nanotech Teaching and Experiential Learning Days” in the classroom where teachers, students and CNEU instruct the class for that day.
- Twice a year, provide parents and guidance counselors of past Camp participants with motivational messages about the Nanotech Camp, CNEU’s investment, partnering school’s programs and in doing so, introducing Nanotechnology as a progressive career choice for culturally diverse students. Utilize promotional items to introduce parents and counselors to websites like [www.guidemenacme.org](http://www.guidemenacme.org) which describe the role parents play in preparing their child for college.
- Include a college preparation module during free time at the Camp that includes representatives from PSU’s ab other partner’s Admissions, Financial Aid, Career Center highlights. Invite African American and other minority science and technology students who may be on the campus for the summer; show students the math and science departments on campus; give students an opportunity to discuss their hopes and dreams. Give students a list of college preparation and scholarship websites
- Do the following to create an excitement about studying science, technology, engineering and math at Penn State:
  - At end of the Camp, give students PSU brochures and giveaways

- At the end of Camp, create a flyer of photos with captions of the camp experience and mail to camp participants entering the 12th grade with a college planner (planners available at [www.collegeboard.com](http://www.collegeboard.com)).

