

RET Notre Dame 2011



Family Science November 2010 Room 248



Nano- Day at the 59<sup>th</sup> Street Library – April 2011

## Planning for Nano-Science Outreach

STEM Enrichment for the High Ability  
Mike Lewis - West Side - Gary Indiana

### Introduction:

The students in the following enrichment are drawn from the High Ability population 6-12 in the Gary Community School Corporation. The high school students work on at least one day after school and one main objective is delivery of a Saturday School Engineering Program for middle school students drawn from that city wide population. A second main goal of that high school group is to practice STEM activities so that a continual cadre of experienced presenters is available for presentations. The following outreach plan has to be modified to fit your access to your interested student population.

Materials for Nano-Activities were obtained from the **NISE Network** (google this). If you go to catalog and then click Fundamentals you would see “Exploring Structures – Bucky Balls” and then see the 1) Big Idea, 2) Learning Goals, 3) NISE Net content map and 4) Universal design.

Your outreach activity gives you a chance for students who excelled in an in-class experience such as the spaghetti bridge (picture on left above) to showcase their activity being flexible to make sure everyone guesses the breaking weight of their spaghetti before experimentally breaking it. As the data is collected the ideas of direct and inverse variation and the constant of variation can be introduced depending on the participants skill and/or interest. Given the available technology the graphs of the data derived can be explored with its predictive value and limitations. Mr. Lewis was first exposed to this investigation in Book 3 of the Core Plus Mathematics out of Western Michigan.

Many games and group activities are available from the NISE Network. Exploring Fabrication – Self Assembly;

[http://www.nisenet.org/catalog/programs/exploring\\_fabrication - self-assembly nanodays 2010](http://www.nisenet.org/catalog/programs/exploring_fabrication_-_self-assembly_nanodays_2010)

In the spring the student who became the organizer in class had previous experience with the activity at a leadership conference. This self assembly in( <http://www.fractal.org/Bio-Nano-Robotics/Fractals-in-nano-devices.pdf>) nature then connects to the study of fractals in mathematics.... The google question I asked “ How are fractals like natural self assembly? “

- The importance of the outreach event is to broaden and deepen both the presenters experience and the audience by continually asking the next question.
- In our events we have a pre-test and event check list with prize to enhance the engagement of everyone involved.

In our events the Nano content objectives relate to:

- Small compared to What? (Scale factors) And....
- Very small has different characteristics compared to large (macro)

My source for materials and help has been the **Science Museum of Minnesota**.

**Other sources to get you started:**

- Discover Nano [http://www.discovernano.northwestern.edu/index\\_html](http://www.discovernano.northwestern.edu/index_html)
- Nanoreisen <http://nanoreisen.de/>
- Nano Ed Resource Portal <http://www.nanoed.org/>

**OR** just google nanosense..... a NSF funded project with SRI (Stanford Research Institute)

My immediate goals include improving the student exposure, experience and content rigor that will not preclude a possible choice of a STEM career post 12. The STEM/Nano outreach events are part of the exposure and experience aspect of this goal. Continual revision of the plan has to occur because:

- the skill sets and motivations differ from year to year
- it must build programs around key students
- everything is challenging in a city and district which is in population and economic decline
- Constant physical and pedagogical restructuring allow for no resources outside bus support and professional time from the district

Greatest weakness is in the marketing, public relations and community involvement aspects of the pre-engineering program. Mr. Lewis [lewis\\_464@msn.com](mailto:lewis_464@msn.com) (underline between s\_4 in e-mail address)

