

## What Makes a Difference?

Wednesday  
April 25, 2007

## Dr. Greg Stefanich

Regents Professor  
University of Northern Iowa

When teachers assume responsibility to engage all students the learning gap narrows and classroom achievement improves (Haycock, 2002).

If American education is devoted to education for everyone; it is essential that *all* teachers have the knowledge to make appropriate adaptations so that *all* students, regardless of ability or disability, can be active participants in the learning process (Stainback, Stainback, and Stefanich, 1996).

### **In science classrooms, students with disabilities performed better and enjoyed school more when teachers:**

- Provided multiple exposures to new terms and concepts (Wood, 1990).
- Adjusted assignments and acquired alternative resources (Lawrence, 1988).
- Allowed students opportunities for exploration using heterogeneous cooperative groups (Krashen, 1994).
- Used projects, drawings, labeled diagrams, and posters in assessment (Hansen, 2006).
- Made carefully designed adaptations in the general education setting, rather than relying on pull-out programs (Stainback, Stainback, and Stefanich, 1996).

### **In science classrooms, all students performed better and enjoyed school more when teachers:**

- Employed hands-on, experiential learning in an informal, flexible learning environment (Gilliland, 1999 and Simpson, 2002).
- Employed collaborative processes where students were given opportunities to work together (Hilberg & Tharp, 2002).
- Incorporated games (Curtin, 2006).
- Brought in visual aids or models whenever possible (Riding and Rayner, 1998).
- Provided the necessary supports for success and held high expectations (Curtin, 2006).

### **Common Misconception #1**

- When students don't learn, there is something wrong with the student.

Under everyone's hard shell is someone who wants to be appreciated and loved.

### **Common Misconception #2**

- Reading is the most important skill taught during the early years of schooling.

The White Skip was in the hack. He held the hammer. The third man was in the house. The sweepers were poised. The rock must draw the button. The Reds had a guard at the top of the house. They had a scoring rock at the 8 foot. The skip threw the hammer. The sweepers heard, sweep, stop, sweep, stop, sweep. The rock nipped the point and the game was lost. The sweepers were angry.

- Who was in the hack?
- Who was in the house?
- What must the skip draw?
- What did the rock do?
- How did the sweepers feel?
- Why were the sweepers angry?

### **Common Misconception #3**

- Facts are difficult to learn.

### **Common Misconception #4**

- Safety is a major concern in teaching science to students with disabilities.

### Common Misconception #5

- There are many aspects in laboratory science learning which students with disabilities cannot participate.

### Resources that Improve Student Access to Observation and Data Collection

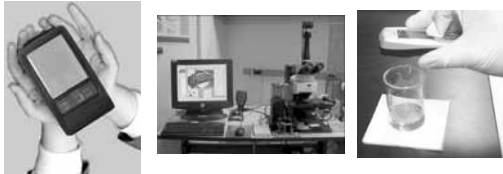


■ [www.vernier.com](http://www.vernier.com)

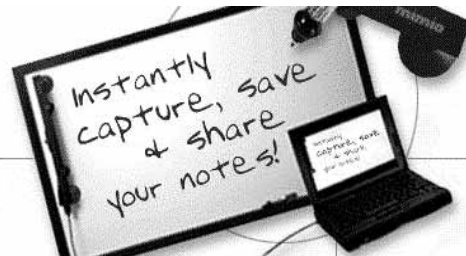


■ [www.proscopehr.com](http://www.proscopehr.com)

### High Tech Science Tools



### Interactive Whiteboards



### AccessSCOPE

**Brad  
Duerstock**

**Purdue  
University**

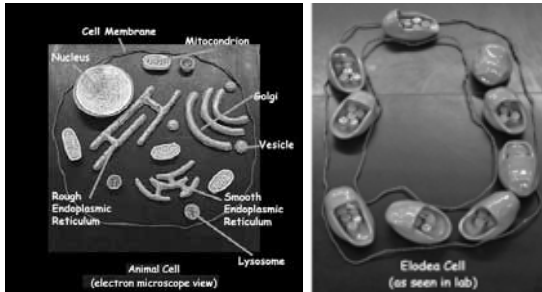
**NSF-HRD-0533124**

### AccessSCOPE



(AccessSCOPE, Purdue University, NSF-HRD-0533124)

## Tactile Biology Models




(Mary A. Moriarty, Springfield Technical Community College, MA, NSF-HRD-0004326)


 University of Wisconsin - Madison  
Center for Biology Education


### 3-D Rapid Prototyping



 NSF-DUE-04112798

 University of Wisconsin - Madison  
Center for Biology Education



 NSF-DUE-04112798

Tactile and Technology Focus Group



## Hand-Held Immersible Light Sensor



(ILAB, Pennsylvania State University, NSF-HRD-0435656)

Special needs students educated in regular classes do better academically and socially than comparable students in non-inclusive settings. The review yielded the same results regardless of the type of disability or grade level (Baker, Wang, and Walberg, 1994).

The more time children with disabilities spent in regular classes, the more they achieved as adults in employment and continuing education, regardless of gender, race, socioeconomic status (SES), type of disability, or the age at which the child gained access to general education (Ferguson and Asch, 1989).

Schools should be centers of care and concern, and serve as filters for race, ethnicity, religion, gender, sexual orientation, disability, and culture (Noddings, 1992).

To ignore the facts does not change the facts.

**In science classrooms where there were high proportions of students who were from African American background, students performed better and enjoyed school more when:**

- Teachers mediated the nature of academic content and inquiry with consideration for cultural diversity (Lee and Fradd, 2001).
- Parents and community members were encouraged to become involved in students' education and were given a significant voice in making important school decisions {Eggen (2002), Taylor, et al (2000)}.

**In science classrooms where there were high proportions of students who were from American Indian background, students performed better and enjoyed school more when teachers:**

- Presented the whole concept before focusing on segments and details (Cajete, 1999).
- Had a mentor available to help guide teacher decisions through the cultural and historical circumstances unique to the cultural context (Starnes, 2006).
- Attended appropriate cultural, social, and sporting events (Starnes, 2006).

**In science classrooms where there were high proportions of students who were from English Language Learners, students performed better and enjoyed school more when teachers:**

- Walked through a problem rather than requiring students to figure it out on their own (Curtin, 2006).
- Chunked information into short segments (10 minutes) and allowed short times to discuss with a neighbor what was learned (Hansen, 2006).
- Used projects, drawings, labeled diagrams, and posters in assessment (Hansen, 2006).
- Did not "blame" students for not learning and were always seeking new teaching strategies (Curtin, 2006).

**In science classrooms, girls performed better and enjoyed school more when teachers:**

- Were non-sexist and strong leaders (Settles & Cortina, 2006).
- Demonstrated appreciation for women's participation in science (Vidal, 2002).
- Served as mentors and guides (Downing & Crosby, 2005).

### **In science classrooms, Lesbian, Gay, Bisexual or Transsexual students performed better and enjoyed school more when teachers:**

- Completed professional training on LGBT needs, and skills in meeting those needs (Bailey N., 2006).
- Acted assertively to prevent harassment, demeaning statements, demeaning gestures, or isolating maneuvers by others (Bailey N., 2006).
- Became aware of a safe person to whom students can turn to get accurate information about sexual orientation or gender identity (Bailey N., 2006).
- Examined the library and multi-media sources to ensure that there is an age appropriate body of information and literature on L,G,B,T (Bailey N., 2006).

### **In science classrooms, gifted students performed better and enjoyed school more when teachers:**

- Spoke frequently and frankly with students about their progress in and out of school (Bailey L., 2006).
- Communicated with other teachers, all of them (Bailey L., 2006).
- Gave pre-assessments so that students who actually knew the materials did not have to repeat instruction (Johnson, 2000).
- Allowed opportunities for curriculum compacting, and students were allowed freedom to enrich their learning experiences (Reis, et al, 1993)

### **What Barriers do Children with Physical Disabilities Face?**

- Parents and school advisors who limit the children through stereotypes and low expectations (Stefanich, 2002).
- Classroom structures that limit accessibility and reduce exposure to tactile manipulative experiences that are critical to basic learning in science (Stefanich, 2002).
- Science programs that have not been modified or adapted to meet the needs of children who have physical impairments (Stefanich, 2002).
- Teachers who may harbor fearful or negative attitudes or who may treat the children in an overly protective or cautious manner (Stefanich, 2002).

The current focus on high stakes testing has increased oppression and isolation of students with disabilities and/or those who are culturally different – those who perform poorly on norm-based measures (Noddings, 2002).

- Conversation is an important informal way to gain information about what students have learned.
- Through questioning, a teacher can often determine if a student's understanding is secure or vague.
- A group or singled response can give teachers a lot of information about instructional effectiveness, without singling out an individual student.
- Hands-on assessments allow teachers to observe the quality of students' performance in using science tools and science thinking.
- A portfolio allows students to tell a story about what they have done and what they have learned.

### **Who Are the Gifted?**

Isaac Newton did poorly in grade school.  
Thomas Edison was withdrawn from school in the first grade because his teacher told his mother he was a dullard.  
A newspaper editor fired Walt Disney because he had, "no good ideas."  
Verner von Braun flunked ninth grade algebra.  
Louis Pasteur was rated as "mediocre" in chemistry when he attended Royal College.  
Abraham Lincoln entered the Black Hawk War as a Captain and came out as a private.  
Winston Churchill failed the sixth grade.

## **Expert Opinions on the Future**

- "Everything that can be invented has been invented."  
Patent Commissioner C. Duell, 1899
- "Unworthy of the attention of practical or scientific men."  
British Parliament (on Einstein's incandescent lamp), 1878
- "Who would ever want to use one of them?"  
President Rutherford Hayes (evaluating the telephone), 1876
- "I think there is a world market out there for about five computers."  
IBM Chairman Tom Watson, 1943
- "No woman in my time will ever be Prime Minister."  
Margaret Thatcher, 1969
- "We don't like their sound. Groups of guitars are on the way out."  
Decca Records (turning down the Beatles), 1962
- "It's too early for a Polish pope."  
Cardinal Karol Wojtyla, 1978

"...these inventions will produce forgetfulness in the souls of those who use it. They will not need to exercise their minds... It equips pupils with only a semblance of learning, not true learning. Thanks to these inventions, students will be without benefit of teacher's instruction..."

## **"BOOKS"**

**Plato, circa 387 BC**

## **A Few Rules to Live By**

- Give people more than they expect and do it cheerfully.
- Don't believe all you hear, spend all you have, or sleep all you want.
- Never laugh at anyone's dreams.
- When you say "I'm sorry" look the person in the face and be sincere.
- Express love every day.