



## **A Community Conversation: Diversity in the CS Classroom -- Retrospective**

of a Workshop held Tuesday, August 19, 2008  
*A Collaboration of the OPAS Initiative, ETIC CS Task Force &  
Techstart Education Foundation*  
**November 13, 2008**

### **Facilitators:**

- Eda Davis-Lowe (OSU/SMILE; OPAS Succeed)
- Chris Brooks (Techstart, OPAS Prepare, ETIC CSTF)
- Don Kirkwood (North Salem High School, OPAS Succeed)
- Don Domes (Hillsboro High School, OPAS Prepare, OPAS Motivate)
- Ron Tenison (videographer; OCSTA, Techstart, ETIC CSTF)
- Jo Oshiro (OPAS Staff)

### **Attendees:**

- Nick Asay, Falls City Middle School & District Technology Coordinator
- John Colvin, Canby High School Computer & Digital Electronics Teacher
- Mark Gullickson, Central Elementary School, Albany & District TAG
- Steve Nelson, Hillsboro High School Computer Teacher
- Tamara Purkey, Cleveland & Marshall High School Teacher & Club Advisor, Portland
- Kathy Roberson, McNary High School Computer Teacher, Salem
- Greg Smith, West Salem High School Computer & Robotics Teacher & Coach
- John Stearns, Amity High School Computer & Woods Teacher
- Chris Winikka, Century High School, Hillsboro

### **Executive Summary**

The Community Conversation: Diversity in the CS Classroom workshop was held in North Salem August 19, 2008. Eda Davis-Lowe, Don Kirkwood, and Don Domes presented best practices in diversity programming and instances of particular implementations to 9 teachers. A brainstorming exercise focused on particular challenges to and resources for implementing best practices in a teacher's local environment. A group discussion on the necessary and sufficient conditions for pioneering a CS program, or any technology program, at a school finished the day. Initial feedback from all participants was positive. Participants have been invited to apply for minigrants from the Techstart Education foundation. OPAS workgroup members will participate in the minigrant reviews. Techstart will administer the grants.

This event was an important first step in what we hope will be an ongoing series of conversations about implementing best practices. Gaining additional feedback from the participants about the quality and utility of different elements of the conversation will help improve the experience for future offerings.

### **Materials Archive**

Archive [http://opas.ous.edu//Workgroups2007/Succeed/Community\\_Conversation\\_Archive.html](http://opas.ous.edu//Workgroups2007/Succeed/Community_Conversation_Archive.html) includes links materials distributed or shown at the workshop and links to additional materials referenced during the day.

### Agenda

- **8:30** Best Practices in Diversity in the K12 Classroom – an overview – Eda Davis-Lowe
  - Overview – Eda Davis-Lowe; handout [STEM Diversity: Who Benefits?](#)
  - Exemplar Don Kirkwood; handout “No Boys Allowed” [NBA outline](#)
  - Exemplar Don Domes; handouts [ELL slides](#) – [Enriching STEM slides](#)
- **10:30** Brainstorm in small groups with recorder/ facilitators
- **12:00** Box Lunch on site
- **12:30** Report back of small groups
- **1:00** Working from ideas to get to plans – an example, including NBA task breakdowns
- **1:15** Reflect, write and critique (Chris, Eda, Don, Don, & Jo) initial implementation plan
  - *Optional planning templates* – [Plan of Action](#) – [Strategic Implementation](#)
- **2:45** Share and critique plans
- **4:00** Equity minigrant [application](#)

Comment [EDL1]: “Getting from ideas to plans” -- Something is missing here. I am not sure what word you intended to use.

### Meeting Record

#### An Overview of Best Practices in Supporting Diversity in Educational Programs

Eda gave a short introduction to Best Practices and considerations in creating programs to foster STEM Diversity. Diversity in K12 educational programming benefits participants and wider society through:

- Enhanced learning
- Educational and Career Aspirations
- Increased Social Interaction
- Improved Attitudes

These programs and populations often have four **Common Barriers** to full participation and engagement. These barriers are not equally weighted for all target populations but are very similar for females and underrepresented minorities (URM):

- Perceptions / Attitudes– student self-perceptions and the perceptions of the important people around them about the students’ the ability to do math and science, as well as the value of math and science in their everyday lives
- Academic Achievement – more and more females are academically eligible to pursue STEM; not as heavily weighted for females as URM
- Role Models
- Limited opportunities in STEM outside of the classroom – the relevance piece, if they can connect STEM to something important to them, it will help them build relevancy. More heavily weighted for URM.

Eda reflected on factors of success for small schools, based on her experience with SMILE (<http://smile.oregonstate.edu/>):

- Teachers in SMILE clubs are able to interact with schools differently – and are able to become mentors to their students and to other educators and, for their students, expand the pool of non-parental caring adults.
- Conversations with families to help develop consistency of message – finding ways to increase the capacity of families to support educational aspirations.

*OPAS Succeed Workgroup – A Community Conversation: Diversity in the CS Classroom  
Event Record for August 19, 2008*

- Peer group – in this group (e.g., SMILE club) it’s ok for you to want to go to college, to like math, to want to do engineering – creating the safe place feeling.
- Partners across the communities

John Colvin commented that his experience is that in Hispanic perceptions, especially for women, the community dictates what they will or will not do. Family is more important than anything else – and for women especially that means getting married and having kids.

Eda: That’s why we work with families, to help them see possibilities beyond their own experience – how **higher education can enrich not only economics, but family life. Create a sense of what college might mean for the family, while being sensitive to the culture.** In some cultures, boys key on physical labor, so they too are not looking to go to college. **Early intervention is key.** SMILE starts in 4<sup>th</sup> grade. We started in middle school in 4 communities; early in the 2<sup>nd</sup> year of the program we realized middle school is just too late – kids are already convinced they could not do math and science, could not go to college, and would do the same kind of work their parents did before them. **Instead of remediation, grab them early before the achievement gaps open.**

### Best Practices Exemplar Don Kirkwood

In his classroom, Don constantly uses metaphors. He keeps telling his students the goal is to be smart and lazy – in math, that means do the job up front, don’t have to cram. One of his favorite metaphors involves his son, who as a toddler LOVED bananas, and he tells this story to create incredible visual imagery immediately accessible to his students: Son loved bananas so much that if you put one down in front of him, he’d cram so much in his face he couldn’t bite, chew or sometimes even breathe. To get what you want, take one smile bite and chew it well – beats **cramming!** In problem-solving, solve manageable parts and then expand – chew and swallow one piece before taking the next bite (or byte!)

**Comment [k2]:** Problem solving – solve manageable part and then expand – chew and swallow one piece before taking next bite (byte??? – pitiful geek humor)

Don’s Best Practice involves elements of marketing, near-peer mentoring, student leadership, and targeted recruiting. The “No Boys Allowed” (NBA) event originated with one of Don’s female students about five years ago. The first NBA alums just graduated; and two of them are going to Willamette and Seattle Pacific with scholarships. NBA participants are 8<sup>th</sup> grade girls.

NBA is student-organized and produced; student volunteers are both genders. It works out to be one volunteer per two participants when all is said and done. “Student ownership radically changes the event” and Don wants it to stay that way.

The first events were held on a Saturday. Now the timing is keyed to high school registration. Four weeks before registration the high school students go to the middle schools for “Flash and Dash”, the NBA event itself is held two weeks later, and then the week before registration, Don visits Algebra I classes that will be in Honors Geometry in freshman year. Don takes the list of interested students and gives it directly to the counselors in charge of freshmen. “Flash and Dash” are short classroom visitations by high schoolers which recruit participants for NBA. After registration and NBA are over, Don follows through with parents.

Ideally NBA is done on a day when the middle school has class and the high school doesn’t. An even better draw is to pull the middle schoolers out of class.

NBA activities:

- Do rotations - programming, networking, robotics, CAD, shop
  - make jewelry boxes – takeaways are great, really make an impression;

- lunch with one or more guest speakers; former graduates come speak about their jobs; he has talked about Jose Alvarado, a former student who got a full ride scholarship – the role model doesn't have to be in the room! The best possible speaker is a former graduate who is now a professional – and a woman.
- they do evaluations
- giveaways include laptops, cameras, things that really draw people in and create excitement – door prizes for participants and student organizers.

**Comment [k3]:** Best is a professional woman who is a former graduate

Don points out that the new Perkins requirements and CTE programs are keeping statistics on participation and equity – you can point out to administrators, that if equity is not achieved, the money goes away:

- business and health need males;
- computer classes needs students of color and females.
- When administration understands the benefits, they will cover time away from class to visit feeder middle schools.

Those in generational poverty don't think they can break out of poverty and they don't know what's out there anyway. Don has gone to a Latino church to recruit parents.

Things that makes a big difference in the classroom:

- interdisciplinary approaches work. Girls think of computer as a tool; boys think of it as a toy. A tool must be for a purpose beyond making money. Interdisciplinary integration comes from Honors Geometry – Intro CS interaction. He has an overlap of 3/4 of the students, making for great continuity.
- Arrange room with non-computer seats (or you will have a certain segment of the population, mostly boys, coding before the problem has been all explained).

North Salem is about 35% Latino, most of that within the last 5 years.

### **Best Practices Exemplar Don Domes**

Don has taught for 30 years. Currently he is at Hilhi, which has 1500 Students, 40% of whom are students of color, more than 10% of whom are ELL and over 33% of whom are in a tech class every day. Administration started sticking in ELL students in his courses and they were floundering. Don's strategy: Follow the money. Get more people involved. His aide was paid for out of the ELL department, and he found better ways to utilize that aide time.

If you get the desired results, analyze what caused this? Identify the factors – which may involve sucking it up and listening to a critique of your teaching methods or other approaches.

Critical essentials for effective use of an ELL aide in a tech class:

- Common planning time
- Involvement in and mastering of the class material
- Common approach with students
- Full period participation
- Translate concepts not words
- Arrange for dedicated workspace so they can be organized
- Additional considerations listed on the slide set.

One of the challenges of using an aide is that they are poorly paid, so turnover is high. Plan for it.

The Forgetting Curve: The first 4-5 weeks of the term are critical to the establishment of relationships, learning foundations for more advanced concepts. As the class progresses through concepts in the sequence, students start forgetting the earlier concepts. To counteract this, Don pays an aide to conduct after-school help sessions early in the term – much more effective than later in the term when those who had Bs start dropping as the Forgetting Curve kicks in and the concepts become more additive and complex. For Gen Y and Gen X, 4 to 5 week lead time is so far out of their experience that is not going to work.

Do the math: one teacher does not have enough time to effectively teach a large class complex concepts. You need help – volunteers, aides, other students. One way to get help is to leverage money sources such as CTE Targeted population grant (through Mary Bunn at ODE) or the District’s TAG mandate and money.

Don’s Wisdom:

- After-school enrichment activities are important: robotics, InvenTeam, Design for the Other 90%.
- Work Hard, Have Fun, Eat Food. Spend money on pizza.
- Recognize accomplishment; involve adults from the community.

Greg Smith asked for advice on handling “borderline” kids who want to take CS but do not have the algebra for prerequisite. Don Domes advised leveraging student aides to help individualize curriculum and Don Kirkwood advised creating a half-step in curriculum by adding programming elements to a technological literacy, STRUT or other class.

### Small Group Brainstorming

**Prompts: Implementation of Best Practices in a Local Setting – Think about:**

- What are the biggest diversity issues you face? Any of socioeconomic, gender, ethnicity, language, cultural, post-secondary plans or something else?
- What are the biggest challenges to diversity in your school or classroom?
- Are there some effective practices used in your school or your classroom to address these issues?
  - If so, what are they?
- Are there key components we are seeing repeatedly?
- Which of the Best Practices we’ve seen so far do you think would work for you?
  - Why?
- Who or what, other than large amounts of money and FTE, would assist you in establishing these best practices in your classroom or school?
- How would you secure that assistance?

**Insights:**

- Recruitment is an ongoing issue, particularly of girls, Latinos, and those in generational poverty. There is some contention with programs like band and sports, especially after school. All the teachers thought reaching down into middle and elementary programs would be valuable, but perhaps extremely difficult. Many if not most kids and their families, do not have any expectation that learning about technology or technical subjects is a necessary part of their education. Some are not even aware of the possibility, much less the option. **Outreach is critical.** Using students to reach slightly younger students is key. Having an aide that your target population can identify with is extremely valuable.
- The work involved in going through the channels in the system can be daunting.
- Competition for resources can start with access to the computer lab.
- For some populations, the potential to earn money as an intern working in an air-conditioned office can be a big carrot.

- Program longevity is an issue – teachers are retiring, and teacher certification issues come into play.
- Building programs off of existing parts can be problematic.
- A pool of volunteers from industry would be very valuable
- Collaborating with other schools is very valuable; tools to facilitate this would help – conferences, workshops, social networking tools.
- Better learning materials and curriculum; identifying known good sources for curriculum.

### **Minigrant Program Description:**

*From the application form:*

#### **Equity Mini-Grant Application – Due Date: Monday September 22, 2008**

Funds will be administered through the Techstart Education Foundation. No more than \$1,000 will be granted to selected educators for developing and implementing activities focused on recruiting and retaining a target population (young women and/or other underrepresented populations) to computer science and engineering courses at the grantee's high school.

- Host schools/districts will provide some form of cost sharing: (e.g., venues; release time; subs).
- While not all programs will be immediately successful, baseline and after-activity/event data must be collected to quantify program success. Measurements by gender, ethnicity, and socioeconomic status of enrollment, activity/event participation, contact hours per student, follow-on registration and some measurement of continuity or longevity of student participation in the program or class sequence will be reported.
- All grantees will submit follow-up statistics and short status reports
  - o After the activity (e.g., attendance at a recruiting fair; at the end of the semester/term for a curricular change) including copies of all relevant receipts.
  - o after the school's registration for the recruiting target year (i.e., after 2008-09 recruiting for 2009-10).
  - o At the end of the academic year, if there has been any change in status or spending.
- All grantees will submit a final report by October 31 of the following academic year (October 31, 2009).
- Grantees not submitting such data and reports will not be eligible for further awards.

#### **Participant Ideas identified for development:**

- Kathy Roberson: An NBA-style event. Explore getting an ELL tutor into the elective section.
- John Stearns: Attract more girls into drafting and CAD/CAM, put more CNC into woodworking curriculum. The NBA model would be very effective in Amity.
- Tamara Purkey: FTC all-girls' team
- Chris Winikka & Steve Nelson: collaborate on marketing, a one-day event, port model between the schools
- Nick Asay: develop curriculum electives with interdisciplinary focus – graphic design, video and music-making; buy a plotter (banner-making type) Working hard to build expectations into district on what is needed (and why) to graduate with increasing requirements. Call out that tech is going to be needed. Looking for curriculum and language that would be approachable.
- John Colvin: spread so thin, hesitates to do something different, but is very interested in leveraging an ELL aide; TAG Saturday; possibly using a digital electronics kit.
- Greg Smith: FIRST Tech Challenge middle school girls' team; have them do some presentations – Chemeketa Tech Conference.
- Mark Gullickson: Saturday program for TAG kids, target girls, use the same materials within the classroom and incorporate into the curriculum.

### Necessary and Sufficient Conditions for CS and Technology Programs in Schools:

- Champion with lots of commitment (e.g., teacher, administrator, a powerful parent)
  - Some participants feel a parent champion is very, very important.
- Ally with money (e.g., administrator)
- Demand or someone to create it
- Teacher to teach the subject
- Marketing to students to sustain demand (necessary for any non-required subject)
- There is not a one-size-fits-all solution.

Once these elements are in place, issues about ongoing teacher support, including professional development and availability of quality curricular materials may come into play.

### Conclusion

This conversation provided an important first step in what needs to be a series of ongoing offerings for computer science and technology teachers to learn about best practices, to reflect on the opportunities and challenges in their locations, to brainstorm strategies for implementation of such practices in their classrooms and schools, and to explore funding to support their work. Gaining additional feedback from the participants about the quality and utility of different elements of the conversation will help to refine the agenda and to improve the experience for future offerings.

**Comment [k4]:** Very, very important, because, although the rewards are great, there is a lot of work involved; but "smart and lazy". I get radically more enjoyable teaching because of the work put into process.