



OPAS Succeed Workgroup

Propagating Success: Sharing Lessons from Don Kirkwood's CS Program at North Salem High School

June 12, 2008

Ongoing discussions throughout the OPAS Initiative and in the Succeed Workgroup in particular lead to the following premises:

- Programs do not initiate and sustain change.
- People initiate and sustain change; programs may be part of a particular toolkit people use to do so.
- Conditions, barriers, and resources vary greatly from district to district, school to school, and sometimes from classroom to classroom.
- Teachers are often the best source of knowledge and strategy for managing local conditions to achieve desired results.
- Teachers benefit greatly from a supported and ongoing community of practice.
- What gets measured gets addressed.
- A few programs around the state are showing positive trends in recruitment, retention, and maintaining academic rigor in pre-engineering, CAD, and computer science.
- The OPAS Initiative prioritizes the propagation of best practices and building upon existing documented, measured success.

From this foundation, the Succeed Workgroup has developed “The Propagator”, a proposal for supporting teachers wishing to initiate local changes to increase the participation of all students, and particularly girls and students from underrepresented or greatly challenged populations, in computer science classes and programs. The Succeed Workgroup’s vision includes the eventual extension of this pilot to include pre-engineering classes.

Propagator highlights:

- Recruit teachers who have expressed interest at OACTE, through personal contacts, and at SuperQuest to attend a summer one-day workshop and a fall follow-up meeting.
- Build on existing successes by sharing best practices identified by Don Kirkwood and possibly others.
- Adapt best practices to local conditions to increase recruitment and retention to target existing or new classes in CS.
- Encourage recording data, especially longitudinal data, on students’ enrollment, completion, and subsequent coursework.
- Provide participating teachers and administrators with a toolkit and possibly minigrant funds to stage recruitment and retention events and activities.

Kirkwood's Recruiting & Retention for Computer Science

North Salem High School in the Salem-Keizer School District has 36% ethnic minority students, 13% of them ELL students and 53.9% free and reduced lunch students. Don Kirkwood, veteran teacher of math, computer science, AP Computer Science and interdisciplinary courses, has created a program of events and activities which is successfully increasing recruiting high proportions of girls and minorities to his computer science classes.

The elements of this program include:

- A progression of CS classes
 - CS 1
 - CS 2
 - C++ (an object-oriented, relatively modern programming language)
 - AP CS - Java (an object-oriented, relatively modern web-oriented programming language)
- An “AB” class schedule instituted in 2007-2008 school year, so student classes differ on alternating days
 - Don's Honors Geometry class alternates with CS 1 in this schedule.
 - Geometry shows a practical application for the CS; material from one class integrates with another, sometimes on alternate days. Girls seem particularly responsive to this approach.
 - 3 weeks of QBASIC procedural programming language for graphics & animation
 - Alice or Scratch – languages optimized for games & animation
 - Python or Pascal – procedural languages optimized for math, task and character manipulation
- Recruiting activities which appear to have made a large difference:
 - **Near-peer mentoring:** NBA == No Boys Allowed: Current girl students organize, publicize, run and are volunteer assistants at activity centers during a day-long event, hosting middle school girls on a no-students-at-school day. The first group of girls recruited as 8th graders graduated high school in 2008.
 - Flash and Dash: 10 to 15 minute presentations given by high school students to middle school classrooms. These presentations include high tech problem solutions, cool graphics, job opportunities and then a pitch for the NBA Conference and sign up.
 - Activity centers: usually a 4 class rotation, taught by teachers, with hands-on activities designed to take about an hour, selected from the following:
 - Computer Science: graphics and animation
 - CAD (Computer-Aided Design)
 - Networking
 - Engineering Design using woodworking as the medium
 - Robotics
 - Swag is featured:
 - T-shirts designed by the student leadership team
 - Door prizes such as desktop & laptop computers, printers, cameras
 - Social interaction is an important aspect:

- Pizza
- Guest speaker – if possible, a former female student now working in some aspect of a technical career
- Teachers teach the centers
- Associated budget: \$2,500
 - District funds cannot be used for pizza and door prizes. Fund-raising, sponsorships, grants and in-kind donations have been suggested as funding mechanisms.
 - Since this is for school district students the use of building is free and student provide their own transportation to program (would probably be even more successful if program was on a day when high school is out and middle school students get to miss school to attend function; no dates like this exist in Salem-Keizer)
 - Consumables are minimal and teachers usually cover these with existing budgets; we are recruiting students for our own programs, so expenses are worth it.
- Jo speculates that the longevity of the event means that parents have had an opportunity to hear about it, and perhaps know students or parents who have attended it, giving it credibility in the community.
- Follow-up visits to the feeder middle schools advanced math classes, sharing (see Don’s OACTE presentation for an example aimed at an adult audience: http://opas.ous.edu//Committees/Resources/Staff_papers/Kirkwood_OACTE_041608.pdf):
 - Career statistics & occupational outlook data :
 - Salaries
 - Job opportunities
 - Helping Society
 - Scholarship opportunities
 - College Credit Now
 - Paid Internships
 - Interdisciplinary Computer Science/ Honors Geometry combo – do your homework on computers
 - Sign-up
- Student-led technology conference for fellow students at Chemeketa
 - All district students are invited – but the focus of advertising for the event is in technology classes.
 - Chemeketa recruits universities and local businesses to set up exhibit tables aimed at student participants (OSU, OIT, PSU, ...)
 - Chemeketa and/or MWEC provide lunch
 - Greg Smith runs a robotics competition (a pared-down event based on FIRST LEGO League) concurrently, also at Chemeketa.
- Recruiting activities used in the past which did not appear effective enough:
 - Personal letters sent to 8th graders, attached
 - Visit high school classes before registration date
 - 8th grade parent orientation visitation (no longer done).
 - Gym table and activities

- Parents in discussion groups
- All 8th graders seeing a PowerPoint presentation discussing the academies available. North's new academy structure is now calling Don's group STEAM – STEM with the addition of Art. It's unique, but with a very positive art group, Don thinks it will be very effective.

CS Class Enrollment Data

Class	Demo	2008-09	2007-08*	2006-07*	2005-06*
CS1	Total	129	55	21	19
	TBD	55			
	Female	39	16	3	3
	Latino	35	20	5	4
CS2	Total	93	41	14	28
	TBD	24			
	Female	36	12	3	6
	Latino	33	13	5	6
C++	Total	53	21	24	20
	TBD	53			
	Female		4	3	1
	Latino		17	7	5
Java	Total	82	25	25	23
	TBD	82			
	Female		4	3	1
	Latino		7	10	5

Notes:

- * closely approximated from old grade books
- 2008-09 demographic stats are incomplete at this time, as Don's breakdown is based on only those students he personally signed up.
- 2007-08:
 - schedule changed to AB; students no longer able to take 4 CS classes during 1 year
 - Final recruiting mechanisms in place for this registration:
 - Visiting middle schools
 - Interdisciplinary Honors Geometry & CS combo
- 2006-07: non-AB schedule, so only the largest class was counted
- 2005-06: non-AB schedule, so only the largest class was counted

Proposed Support Mechanisms for Program Propagation

At the Oregon Association of Career and Technical Educators April 2008 conference, several schools expressed interest in learning more about how Don achieves his results, Don has sketched the following framework for supporting the development of locally appropriate programs:

- Summer Meeting of interested teachers, sponsored by SuperQuest/Techstart:
 - Bill Crucial – Oregon School for the Deaf
 - Greg Smith – West Salem High School
 - Kathy Roberson – McNary High School
 - Jim Lorenz – South Salem High School
 - Steve Nelson – Hillsboro High School
 - Chris Winikka – Century High School (Hillsboro)
 - Mike Reams – North Salem High School
- Agenda:
 - Discuss North Salem’s process and statistics (1 hour)
 - Recognizing that other schools may not be able to copy North Salem’s program “verbatim”, each teacher works up with a similar process tailored to their school (4 hours)
 - Mutual brainstorming to identify particular local barriers, resources, and potential resources. Some particular barriers might be:
 - Lack of AB schedule
 - Schedule slots
 - Non-paired classes increases difficulty of integrating lessons across disciplines
 - Need to develop community support
 - Ready availability of resources like Chemeketa for Tech Conference
 - Current student population to act as near-peer recruiters
 - Leader/ group critique of individual local plans
 - Each teacher develops a grant proposal for an “Equity Conference/Event” (2 hours)
 - Funding through the minigrant program tied to SuperQuest that we hope to kick-start. See description below and attached draft application form
- Funding -- \$1,920 (assumes venue is free & copying of materials donated):
 - \$1400 - \$200 stipend per attendee per day
 - \$400 – Kirkwood’s stipend → per Don “OK, but other funds more important”
 - \$120 -- \$15 per person for beverages, snack and lunch
- Fall follow-up half-day meeting:
 - Double-check process, adapted steps, compare experiences & adjust
 - Assuming subs are not needed, cost is about \$840 if teachers and Don receive \$100 stipends.

Equity Mini-Grant Funding

We would like to provide teachers and administrators help obtaining donations for door prizes and refreshments, which are crucial to the success of events such as No Boys Allowed. The amounts needed are too small for many major grantmakers, and too large for casual fundraising. School district funds cannot be used for refreshments and door prizes. Because of previous discussions, the possibility of privately solicited donations has been raised, along with questions of administrative overhead. Jo, John Ossowski of the Techstart Education Foundation, and the workgroup sketched out this possible division of administrative tasks.

<i>OPAS</i>	<i>Techstart</i>
Fundraise via personal contacts to select individuals & corporate officers. A previous discussion targeted 5 donations of \$5,000 each.	Publicize the program for donors and grantees (Paragraph on the “Contribute” webpage? Followup letters to phone calls. Donation receipts. Note on SuperQuest materials?)
Provide program and selection criteria (see next page)	Collect funds
Provide substantial draft of application form (see next page)	Collect applications; answer applicant questions
Provide personnel for review of applications, selection of awards, possibly host meeting	Staff support for review committee (screen applications for compliance; distribute packets, possibly host meeting)
Review progress reports/ results	Disburse funds (to schools? Direct to teachers? Cf. InvenTeam model)
Recommendations for future changes	Collect and collate/summarize progress reports

- Open questions:
 - Given Kathy Miller does not have bandwidth for private fundraising until September, is this project still feasible? Do other alternatives for private fundraising exist?
 - What additional information do we need to get funding?
 - Are there barriers or issues to OUS labeling itself as a “partner” in the minigrant program?
 - Can we track free-and-reduced-lunch percentage at the classroom level? Does this differ by district?
 - How rigorous a review is needed?
 - Can we put this together for summer 2008?
- A short list of potential partner/ exhibitor/ sponsors for this type of event/ activity has been generated. Engineers Without Borders has expressed interest and provided a contact person.
- A kit of at least one example solicitation letter for in-kind donations is planned.

Equity Mini-Grant Application

Funds are granted to high school teachers for the purpose of developing events and 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 are expected to provide some form of cost sharing. 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 shall be reported. All grantees must submit copies of all relevant receipts after the event, and follow-up statistics and a short status report after the high school's registration for the recruiting target year. Grantees not submitted such data and reports will not be eligible for further awards.

School:			
District:			
Present Year:		School	CS/ Eng Courses
	Number of Students		
	% Female		
	% Latino		
	% African American		
Detailed Description	Date of Event:		
	Activities Planned		
	Participants		
	Dealing with what equity issue		
	How will this event encourage diversity in your program?		
Budget Description – How will the money be used?			
Budget Table	Venue rental		
	Transportation		
	Consumables for activity stations		
	Publicity		
	Incentives – door prizes		
	Refreshments		
Other			
Signature of Grantee			
Approval of Supervisor			
Approval of Principal			

8th Grade Recruiting Letter to Parents of Girls

Dear Parent(s):

The explosion that has occurred in technology over the last decade is one of the few present trends that we can be assured will continue throughout this century and beyond. Very recently, the US Department of Labor stated that, even with the economic slow down; there are still 410,000 information technology jobs in the US that are unfilled. North High is attempting to be a leader in the computer realm of this expansion and would like to encourage more students to be directly involved with this area. Some of the results of our attempts have been:

1. Two individuals, Manfred Mueller and Sam Kelly, won 2nd place in the US in last year's FBLA programming competition; one in Java and one in C++. Manfred actually tied the winner, but turned in exam a bit later than the eventual winner.
2. Over the last several years many seniors left North planning on majoring in computer science or engineering – quite a few of these are young women. Among this group of students, the amount of scholarship money and computer lab assistant positions are phenomenal.
3. Several students have placed very high in the Linfield Computer Science Scholarship Exam; some earning as much as \$16,000.
4. North students can learn Java (receiving up to 12 hours of college credit - through CS 260), C++ (through preparation for the Advanced Placement AB Computer Science Exam), a two year Cisco Networking class, and/or NTech, where students built, repair and maintain computers and labs.
5. The last several years, Oregon's Agriculture, Forestry, Department of Consumer and Business Services and the Department of Human Resource have employed several teams of North students. These students get credit, are paid nicely and are building fantastic resumes. These students have been assigned to work on Access programming, web page designs, networking, hardware and software installation and solving the 2000 bug in COBOL. Students who have been able to learn Java or C++ by their sophomore year, and have taken N-Tech will have preference for these positions. Taking Intro to Computer Programming, CS I, CS II and AP Advanced Projects - Java, during the first term of a freshman year, is the major way to get on track for this opportunity.

Unfortunately, women have traditionally been denied access to the cutting edge of this technological growth. One of our goals is to attack this disparity and provide a well-trained group of students who are encouraged no matter what their gender. After reviewing our records, we feel your daughter would both benefit by taking Intro to Computer Programming and be an asset to our program. Even though you may have already preregistered, you may still change her schedule. If you have any questions or decide to take advantage of this opportunity, please contact Don Kirkwood at 304-9440 (h) or Don as soon as possible and, we will walk it through the system. If your daughter hasn't already completed her schedule for next year, and desires to take advantage of this opportunity, please have her sign up for part or all of the following sequence of one quarter classes: Intro to Computer Programming, CS1, CS2 and Advanced Computer Projects – C++.

Thank you,

Don Kirkwood
AP Computer Science Instructor