CS4HS Questions
Response from University of Washington

Hi,

Thank you for your patience. I am going to be out of town for the next three weeks and only sporadically on e-mail, but feel free to send me more questions which I can answer when I get back.

I was the student coordinator for CS4HS UW; Crystal and Ed hired me to take care of the logistics.

You can find a rough list of the tasks I completed and of the planning schedule at http://cs4hs.cs.washington.edu/displayPage.php?path=./content/Host/Logistics/logistics.html Tips for the different steps are linked to from the schedule and are found at the bottom of the page.

You can also find a rough budget breakdown at the very bottom of the page: http://cs4hs.cs.washington.edu/displayPage.php?path=./content/Host/Logistics/logistics.html#budget

A general topic list is at http://cs4hs.cs.washington.edu/displayPage.php?path=./content/Host/Curriculum/curriculum.html and I also encourage you to take a look at the schedule and materials for last month's workshop.

Goals

I think you will find the goals of the workshop stated on the front page of the website, but to reiterate, we want to get teachers to encourage ALL their students to pursue computer science. We hope to do this by sharing examples of exciting interdisciplinary research and by sharing ways to incorporate computational problem solving in all high school classes. We think that this will increase diversity in the field and dispel common misconceptions about it.

Evaluation

We conducted entrance and exit surveys. Very few teachers had ever recommended computer science as a field of study to their students. The exit survey found that ALL, with no exceptions, were going to recommend it in the future. Many pointed to specific materials they were planning to incorporate.

At the beginning of my planning phase last winter, I contacted last year's participants to see whether any were willing to come in and talk about how they use the CS4HS material in their classrooms. A few answered with very compelling examples of what they were doing. One had started an after-school program teaching Scratch. Another was using Unplugged in his math class. We hope to do more follow-up of this type near the end of this coming school year. I have graduated and am moving on to a new job, so unfortunately, I will not be able to be involved. Crystal and Ed were speaking of hosting a one-day seminar in the spring for teachers to return to UW and discuss the changes they have made to their classroom teaching.

To make a long story short, a successful outcome of the workshop is an increase in high school students' positive contact with computer science ideas.

Good luck in your endeavor,

Hélène.

Interested in hosting a CS4HS workshop at your own campus? The workshops are energizing and rewarding, but like all good events, they require a bit of organization and a **budget**. Here we've compiled a list of things to consider during each planning phase, including considerations and tips that we picked up while organizing our own.

At UW, a student (grad or undergrad) is hired to take care of logistical details. Although many of the details will vary from host to host, a general outline of the tasks to be completed for a successful workshop follows:

5 months before

- Choose date
- Open registration
- Create approximate schedule
- Advertise
- Register with ACM-TECS and other relevant teacher organizations
- Register for credits
- Register for clock hours

3 months before

- Reserve classrooms
- Book speakers and instructors
- Reserve housing
- Confirm pending applications
- Send out reading discussion instructions

1 month before

- Book catering
- Send directions and maps to campus, rooms
- Start making information packet contents
- Book parking

1 week before

- Make nametags
- Create information packets; goody bags
- Create sign-in sheets
- Consider janitorial service (will there be some on workshop dates? Otherwise, make sure paper towels, toilet paper, soap, etc are accessible)

After

- Tally exit surveys
- Get slides, list of links from presenters
- Make materials, directory available to attendees

Choosing a date

The most important first step is to choose a date, since without one it is difficult to build anything else. Once the date is fixed and facilities (classrooms + housing) are secure, everything else can happen more or less in parallel. It helps to establish a rough curriculum and sample workshop schedule early on because you'll need it in order to get certified for various accreditations, get

affiliated with ACM-TECS, and to get potential participants interested enough to sign up. Before you start publicizing, you'll want both the rough schedule (at least highlights) and you'll also want to be able to highlight whatever credits/hours/stipend you can offer attendees--these are a big draw for teachers.

Considerations to keep in mind:

- How long is your workshop? If you have participants flying into town, then a 4-day format with half-days on the first and last days works well to accomodate travel time. If most participants are local, a 3-full-day format helps to prevent people from flaking on the half-days.
- Weekend or weekday?
- Does the date conflict with other events relevant to potential participants (e.g. AP summer institutes, similar workshops at other universities)?
- Are instructors, housing, and meeting space available?

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ACM-TECS

ACM-TECS is an ACM organization dedicated to K-12 education. Affiliating with them means registering as an ACM-TECS workshop (you'll still have full control over your content), which means filling out a one-page form found on their site. You will need to find a high school teacher ``sponsor'' willing to fill out a post-workshop evaluation (which CSTA never sent last year). Benefits to you include increased credibility, the ability to use their registration resources if you choose, and a post-workshop evaluation of participant feedback. It's also good for your institution to keep in touch with CSTA through this relationship. Finally, they send a bunch of swag for distribution at the workshop. The swag has been a hit.
ACM sometimes sends CS textbooks as part of their swag, which we raffled off only to interested parties since most teachers don't teach CS. The raffle signup is here: (.pdf), (.doc)

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Registration

There are a few factors to decide before you can set up an online registration:

- Will people register or apply? If your workshop is non-national, consider an application process to allow you to put applicatns who are not from your precise target demographic on a waitlist until you see whether you have room for them.
- Are you charging a registration fee? Doing so can help to solidify registrants' commitment to actually showing up. Asking (accepted) registrants to simply mail a check to a designated workshop organizer has worked well in the past. If you don't want to deter participants with a fee, give them their money back (and possibly a bit more) at the workshop.

Some helpful hints for setting up online registration:

- To facilitate automated mass communications later on, ask for every piece of information in the smallest possible unit. For example, create separate fields for first and last name; for address, city, state, zip code; for day/evening/cell phone numbers.
- Use checkboxes or menu selections instead of freeform responses wherever possible (e.g. when asking for subjects or grade levels taught, experience level, etc.). This makes it easier to automatically aggregate responses into meaningful statistics later on.

- If you are certified as an ACM-TECS workshop, they can handle registration for you (details here). If you want to gather detailed participant information (see below) or want to run an application process, you'll probably want to set up your own online form.
- Don't bother creating an online form from scratch. There are lots of tools to help you. Your department or university probably has software to create online quizzes or surveys, and this works great.

Useful information to request on the application:

- Personal basics: First/last name, title, email, snail mail, phone number. Be sure to ask for a way to reach teachers during the summer months, since many don't check school emails during that period.
- School information: School name and address, district name. Does the school offer a computer science class? An AP computer science class? We've found that many local colleges are interested in sending representatives to the workshop in the interest of running their own workshops in the future...it's helpful if you can determine on the application who falls into this camp.
- Teaching information: Grade levels taught, subjects taught, years of teaching experience.
- If your workshop will have parallel tracks, ask the applicants which track they'd prefer--even if you let them change their mind later this will give you an estimate of what numbers to expect.
- Logistical food/housing information: Will they require overnight accomodations? Do they have any dietary constraints? Physical handicaps or constraints?
- Publicity information: How did they hear about your workshop? This can give you valuable information about what works and what doesn't for your next workshop. UW also gave applicants a place to provide contact info for any other teachers that the applicant thinks might be interested in the workshop; a few registrants came to us this way.
- Miscellaneous information: Leave a spot for applicants to write in any extra information. We found that a lot of useful information about people's expectations came through this channel (e.g. "I can't wait to get useful activities for my chemistry classroom's 12 computers!" or "I coach an after-school robotics team and can't wait to learn more about real robotics!")
- Qualifying information: Make sure you get enough information to determine which applicants meet your target demographic. Are they planning to actively teach during the academic year following the workshop? Do they teach the appropriate grade levels and subject(s)?

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Advertising

Before you begin publicizing your workshop, you'll want to make sure that the following are all in place:

- Online registration
- Website. This is crucial to have up and running so that interested parties can get whatever information they need. The website should have a workshop summary/schedule, dates, incentives, an email contact, and a link to the online application/registration.

There are a number of concerns to keep in mind when publicizing your workshop:

- Be clear about your target audience. CS teachers? Math/science teachers? National audience, or local? High school, early college, middle school?
- Be clear about the concrete teacher benefits--in particular, if you're offering credit or a stipend, make that loud and clear. Teachers have all kinds of ongoing-learning

requirements to fulfill, and your workshop is very attractive if it will help them reach their quota. Some of the benefits you can offer by getting certified through the appropriate entities:

- **Clock hours**. Washington state teachers need to earn 150 "clock hours" every 5 years to renew their teaching certificates. You need to certify your workshop for clock hours on a district-by-district basis.
- **University credit**. Not only does university credit count as a lot of clock hours, but earning university credits moves teachers up on the pay scale--they'd rather have university credit than clock hours, all else being equal. Usually this will cost more per student than clock hours, however.
- **Stipend**. Obviously this is expensive, but if you have the budget for it, offering a stipend to participating teachers is a great draw.

The following resources can be good ways to publicize your workshop:

- Your department's outreach coordinator--or anyone involved in outreach--probably has good leads.
- Incoming freshmen/majors are a source of high school contacts.
- ACM-TECS has contact lists which they will use to advertise your wokshop if you are certified with them.
- AP listservs. You must be a subscriber to post, but someone in the appropriate department of your university will be a member and will probably not mind passing along your ad.

Sample resources:

- 2007 General Publicity Blurb: (.rtf)
- Email for principals: (.rtf) This is what was sent to all of the principals we could find in Washington state.
- Email for referred teachers: (.rtf)

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Feedback

Feedback is essential in order to determine what worked (or didn't) about your workshop. This goes for individual curricular elements as well as for the workshop as a whole--its general content and its logistics. Below are the feedback surveys used at UW. Of course you'll want to develop your own surveys reflecting the content of your own workshop, but these are good starting points.

- Survey A: Pre-workshop survey (.pdf), (.doc)
- Survey B: Post-workshop survey about the curriculum (.pdf), (.doc)
- Survey C: Post-workshop survey about the workshop's overall effectiveness. (.pdf), (.doc)

In future years it would be helpful to gather more concrete feedback about what parts of the curriculum are useful/useless and why. How can we actually make a difference in these teachers' attitudes and classrooms?

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Budget

In 2007, the budget for about 70 attendees was a little over $40,000. In 2008, for about 50 participants, the cost was around $20,000. The budget depends a lot on the kind of food provided, whether housing is paid for by the workshop and whether guests are flown in from out of town. A very approximate cost estimate follows. It is likely that the cost categories will be

similar between workshops, but the specific amounts will vary widely. The estimates assume roughly 50 guests.

Category	Estimate	Notes
Meals	$10,000	An hors d'oeuvres and drinks reception is a great way to encourage mingling and much less expensive than a sit-down dinner.
Clock Hours	$500	Different providers charge wildly different prices for the same service as far as we know
Credits	$2,000	Again, this depends on the provider. It could be much less than this
Amazon Cards	$1,000	To encourage participants to do the reading, we provided them with $20 Amazon gift certificates
Parking	$700	
Housing	$5,000	We house in dorms

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Questions? Contact Hélène Martin: ln *at* cs.washington.edu

Images courtesy of Beatrice Anghelache at Carnegie Mellon University

General Topic List

The following are some broad topic areas that the UW CS4HS workshop has attempted to cover with some ideas of the specific sessions that could fit those categories. We make an attempt at explaining why certain topics or sessions are important and what their expected outcomes are. You should look at the 2008 session list for the latest materials, which could easily be adapted for a different workshop.

Interdisciplinary Computer Science: teachers are surprised and impressed to learn that computer science can be applied to a broad range of fields. This is important to emphasize so that all participants, whether they are biology or algebra teachers, have something to share with their students. It also encourages instructors to recommend computer science as a field of study to a broad range of students. These sessions should help dispel the myth that computer scientists do nothing but stare at code all day.
Examples:

- Industry speakers on computational biology, WorldWide Telescope or computer-driven oceanography.
- Short presentations by graduate students doing cutting-edge, interdisciplinary fields. These could include educational technology, neurobotics, ICTD, etc.
- Reading discussions can cover books like On Intelligence about interdisciplinary efforts.

Computational Thinking: CS4HS workshops should convince teachers that computer science emphasizes creative problem solving. Most teachers don't have computers readily available and are not teaching programming so it is important to give them ideas on developing students' computational thinking skills without computers.
Examples:

- CS Unplugged
- Basic cryptography algorithms

Programming: both students and teachers can benefit a great deal from understanding basic programming. CS4HS programming modules should demonstrate that programming is useful by focusing on examples applicable to some of the instructors' fields. There should also be a 'fun' element -- teamwork, little emphasis on pure syntax, and encouragement to experiment. The teachers should walk away understanding how powerful automizing certain tasks can be.
Examples:

- Hands-on exploration of Squeak, Scratch or Alice. This can help illustrate points about algorithms and basic program structure without getting bogged down in syntax
- Basics of Python or another language with simple syntax.
- Programming Lego Mindstorm robots. This could encourage teachers to start FIRST robotics or FIRST Lego League teams at their schools. This is good for demonstrating that programming is about giving computers instructions to follow.

Pursuing an Interest in Computer Science: teachers want to know what can be done in the field and how to advise students who demonstrate an interest. It's important to show them that there are good jobs available in the sector and to explain what a computer science major generally entails.
Examples:

- CS career panel. Invite alumns to talk about their experiences in industry. Preferably, these people should have gone to high school in the US. It's especially nice if some can point to their high school experience and say that they were inspired by what some of their teachers did. This could help the teachers realize they can make a difference.
- Studying computer science at your school. Provide admissions information, workload, example classes, what students go on to do, etc. It's useful to talk about the possibility to transfer from community colleges or other such non-traditional paths.

Diversity: one of the workshop's goals is to get teachers to encourage ALL their students, no matter their gender, race, socioeconomic class, etc, to consider computer science for their future. It's important to be upfront about the current numbers in the field and why that might be bad all around. Ideas for maintaining diversity are relevant to math and science teachers.
Examples:

- Unlocking the Clubhouse is a good book to read and discuss.
- Graduate student presentations could include specialties particularly interesting to women including educational technologies, medical endeavors, etc.
- Career panelists, instructors and volunteers should be drawn from a diverse group.
- Session on engaging girls in technology.

Sample Modules

The following is a categorized list of all of the curriculum modules that we have brainstormed in the past. Feel free to pick a subset of these to create a workshop appropriate to your own audience. Please also refer to the past workshop resources linked from under the Resources link above.

Take-Home Modules	
CS Unplugged Introduce participants to the CS Unplugged material: give an overview of the Unplugged topics, walk them through one or more of the modules, and dicuss ways to integrate the concepts into an AP CS curriculum.	• CS Unplugged site
Food For Thought: Sorting Pancakes Learn how to put sorting in terms of stacks of pancakes!	• Pancake Flipping Slides (.ppt, Steven Rudich)
Food For Thought: Cutting Cake Learn how to fairly divide a cake N ways without measuring!	
Circuits Lab Introduce participants to the basics of circuits and circuit logic. Let them create their own circuits and experiment.	• Requires breadboards, LEDs, resistors.
CS Through Brainteasers Give participants a taste of logical reasoning through the use of brainteasers. Many of these brainteasers are actual interview questions used by Microsoft to hire software developers!	
Kinesthetic Learning of CS	

Demonstrate CS principles in the classroom while getting up and moving! This uses Steve Wolfman's material.	
Squeak Give participants an overview of Alan Kay's Smalltalk programming environment.	• Website for Squeak • $7.00 DVD about Squeak: Squeakers
Teacher Enrichment Modules	
Computational Thinking Introduce the notion of computational thinking: that computer science gives us a way of approaching problems far beyond computer problems, and that everyone will benefit from the ability to approach problems this way. Jeannette Wing's material.	• Computational Thinking (.ppt, Jeannette Wing)
Cryptography Made Easy Gives an overview of the history of cryptography and its basic principles. Emphasizes the connection between cryptography techniques and mathematics.	
CS in the Economy Pinpoint a few examples of computer science at work in the economy. For certain areas (e.g. Seattle) this can be done at a local level (e.g. Microsoft, Amazon, etc.) Show how CS influences the economy and by consequence local landscapes.	
CS at _____ Show participants what is involved in the undergraduate CS curriculumm at your school, so they can give an informed view to their own students. Discuss the types of things that your institution's undergraduates have gone on to do.	
Robotics in the Classroom Discuss various small-scale educational robotics packages and give an overview of current robotics research.	• Multimedia Robots for CS Education (.ppt, Illah Nourbakhsh) • Cognitive Robotics (.pdf, David Touretzky)
Introduction To Programming Gives a basic introduction to programming. Might use python, Dr. Java, Alice, etc. Targeted at those who have never programmed before.	
Teaching Programming Discusses how to effectively teach programming to students. Might cover such topics as recursion or inheritance with specific lesson ideas. Might also discuss how to create effective and accessible programming assigments.	
Cross-Disciplinary Breakout Teachers break out by subject area (biology, chemistry, etc.) and discuss ways to demonstrate to their students the overlap between their own subject and computer science	
Wrapup Breakout Near the end of the workshop, teachers break out into small groups to discuss concrete ways of integrating into their classrooms the things they have learned in the workshop (both concrete CS ideas	• CMU 2006 Questions: (.pdf) • UW 2007 Questions:

and broader issues about accessibility, gender equity, etc.)	(.pdf), (.doc)
Book Discussion Breakout This module requires that participants read a specified book prior to attending the workshop (a requirement that is good for fulfilling "outside-of-the-classroom" hours often required to get a course certified for University credit). Participants can all be asked to read the same book, or can choose from a small list, in which case the breakout should be done by choice of book. Possible books: Unlocking the Clubhouse (Margolis/Fisher), The Search (Battelle), The Turing Omnibus (Dewdney), I'm a Strange Loop (Hofstadter).	• Book Discussion Materials: (.tar.gz), (.zip)
Diversity/Accessibility Modules	
Careers Panel 3-5 "real world" computer scientists discuss their jobs: how they use computer science, what a typical day looks like, etc. The goal is to demonstrate that CS is used all over, and involves much more than programming.	
Mythbusters Dispel various myths surrouding computer science: that it is nerdy, that it is just programming, that all of its jobs are being outsourced, that it requires the sacrifice of fun/family, etc.	
Broadening Computer Science Participation Discuss the issues that affect the levels of participation seen by various groups in computer science (women, minorities). Discuss efforts to equalize the levels of interest in and access to CS across these groups, from the k-12 level and up.	• Engaging Girls in Technology (.ppt, Claudia Morrell)
Site-Specific Modules	
Robot Lab Use LEGO(tm) Minstorm robots to introduce participants to basic programming concepts: command sequencing, branching, loops, etc. We also bring in and demo real robots being used in current research projects.	• Activity Guide (.pdf, Julie Letchner)
UW: Graphics demos Demos of cutting-edge graphics research going on at the UW.	
UW: Motion Capture Lab Tour Tour and demo of the motion capture lab and its capabilities.	
CMU: Human Computation Overview of Luis Von Ahn's work on developing incentives (games!) for humans to do the work that computers are very bad at.	• Luis's Slides(.ppt, Luis Von Ahn)

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Images courtesy of Beatrice Anghelache at Carnegie Mellon University