Demystifying and Degeekifying Computing through K-12 Outreach

Katie A. Siek, ksiek@cs.colorado.edu, *University of Colorado*
Samantha Foley, ssfoley@indiana.edu, *Indiana University*
Jennifer Franko, jefranko@indiana.edu, *Indiana University*
Emily Fortuna, fortuna@rice.edu, *Rice University*
Suzanne Menzel, menzel@indiana.edu, *Indiana University*
Laura Hopkins, lauhopki@indiana.edu, *Indiana University*

In this workshop, we share our experiences creating a viable, self-sustaining outreach program that connects with young members of underrepresented groups. Now in its third year, IU's program, *Just B*e, originally targeted girls in K-12. Today our mission and design embraces all underrepresented groups. Through workshops like this one, we are trying to help other colleges and universities start similar outreach programs. New programs have recently been established at the University of Colorado and Rice University.

Participants will learn how to:

- establish a program
- create an interactive presentation
- dispel unflattering myths surrounding computing
- generate enthusiasm
- advertise effectively
- develop contacts at schools and clubs
- obtain financing and staff support
- train new presenters
- fine-tune the content
- reach sustainability
- evaluate your success
- realize an exponential impact by propagating your program to other schools

Contents

1 Workshop program

Part I:

Introductions and Motivation:

1. Introductions
2. Why we do K-12 Outreach
3. How to persuade others (faculty, administrators, sponsors) that it is valuable
4. How Indiana University does outreach
    - mini *Just Be*
5. How Rice does outreach
    - Sally Ride camps, CS club
6. How Colorado does outreach
    - Inner city schools, high admissions enrollment schools, no budget

Brainstorming Session:

What are your goals/intended audience/method of presenting?

Getting started:

You get a chance to develop your own starter presentation!

(15-20 minute break)

Part II:

1. Keep it going
2. Continue starter presentation development
3. Selected Presentations
4. Audience Feedback

2 Why does our computer science department do outreach?

Like almost all departments of computer science and computer engineering in this country, we are suffering from low enrollments. This fact is even more disturbing when we consider that only about 10% of our undergraduate students are women or other underrepresented minorities.

We in the field know that there are plenty of high paying, rewarding jobs for computer scientists here in this country. The good jobs have not all been outsourced, nor do you have to work for the military to find employment as a computer scientist.

Yet, we struggle to attract students. Why? We think in part because of some myths and stereotypes that surround the field of computing.

- Myth 1: All the good jobs have been outsourced.
  - We show graphs of the number of job requests we get each year that has been steadily increasing since the dot com bust. We also show stats from the ACM report on outsourcing.
- Myth 2: All computer science students are nerdy white males.
  - We address this myth head on in our outreach programs.
- Myth 3: Boys are better at math than girls and you have to be a math genius to be a computer scientist.
  - We use games, interactive media, and challenging dialogue to try to smash these myths and replace them with interest in the wealth of opportunities in computer science.
- Myth 4: Computer scientists are anti-social people who program all the time.
  - We introduce students to different fields of computing that require interdisciplinary research and collaboration.
- Myth 5: Computer science classes are boring – they only require math and programming.
  - We show students the projects they will do their first (e.g., generate a Sudoku game and create a picture mosaic) and last year as a computer scientist (e.g., create a mobile phone application for a local company).

If we don't challenge these myths and the status quo, then too many students will never have the chance to consider computer science. We do outreach because it is our responsibility as a university in our community to challenge these myths. We do outreach because we cannot afford not to.

3 Getting started: How to make contacts at K-12 schools

3.1 Make a presence

Word of mouth is a good way to get started. Create some printed material that you can send or hand out to interested individuals. Start with a flyer, customized bookmark or business card. They are easy to produce and provide a concise format for your basic information. The flyer for the new *Beyond Computing* program at CU contains the following information:

- What is computer science?
- What can you do with a computer science degree?
- The Job Outlook
- Course structure with tracks

A business card with information about the presentation and the contact person is stapled to the flyer.

As soon as you have the resources and time, create a website for your program and add the address to your flyer. Include a brief description of the presentation, some sample slides, pictures of the presenters, and testimonials from teachers who have seen your presentation. Make sure you emphasize that the presentation is free. Include the name of a contact person who can provide more information. Be sure to thank your sponsors. The website will probably not generate K-12 contacts for you, but it is a repository of information that you can refer people to once you have made contact. It is a sign of professionalism and stability.

3.2 Go where they are

Attending conferences and workshops for school counselors, teachers, and administrators is the single fastest way to make contacts! When we started *Just Be*, most of our contacts came from presenting to teachers who attended professional development workshops at IU. We also presented at conferences specifically for junior high and high school guidance counselors and received contacts for schools. Typically for conference presentations, we apply or submit a proposal to present *Just Be* during a session. After we present, we collect names and contact information from any attendees who are interested in our program. We also make sure to distribute brochures about *Just Be*, our contact information, and business cards.

3.3 Don't just preach to the choir

Our initial K-12 contacts were people teaching computer science in high schools and, consequently, most of our early presentations were to students already studying computer science. Now, we try to make contact with teachers of all disciplines who use technology in their classrooms. We recently visited the classes for an English middle school teacher who uses computers in her "writing workshops". She was so excited by our presentation that she encouraged other teachers in her school to invite us for a return visit.

3.4 Establishing contacts

Here are some more suggestions of things you can do to establish initial contacts at K-12 schools. We have listed the suggestions in order from least to most work:

- On-line interest form: Provide an on-line form that people who visit your website can fill out to get more information or to schedule a presentation.
- CSTA: If your school is an institutional member of the CSTA, they can help you promote your program by sending an email blast to a set of targeted teachers in your area. Contact Chris Stephenson, cstephenson@csta.acm.org, for more information.
- Admissions office: Contact your school's admissions office and let them know what you are doing. They probably send representatives into the local schools and may be able to help get the word out.
- News media: Contact the media relations people at your school to see if they will compose a press release about your new outreach program. If not, then write your own release and send it to your school paper and your local paper to see if they might be interested in doing a story. If an article does appear, then include a link to the published article on your website.
- Current students: Find out what high schools your current majors attended and then ask your students to contact teachers who had an impact on them to see if they are interested in scheduling a presentation in their classes.
- Cold calls: Search the websites for schools in your area. Write to principles, counselors and department chairs. Keep your letter short and include a link to your project website. From our experience, most of these solicitations are not answered.
- Career days: Call schools in your area to ask out about any career days they might be planning. Find out who is organizing the event and volunteer to present.

Keep a database of all your contacts. Once your program is established, you may want to send some sort of mass mailing (newsletter, brochure, etc.) to everyone who has ever expressed an interest.

3.5 Open a communication channel

Each school representative who expresses interest in your program at a conference should be sent some sort of follow-up letter or phone call. The idea is to connect with the person to get information from them about a potential visit and also give them the resources to learn about your program. A single point of contact at your school is preferable so that none of the information is lost. Websites and web forms are also useful for posting and gathering data. Appendix A contains a generic version of such a follow-up letter. In our experience, we have found that it works best to contact classroom teachers by email. However, with guidance counselors and other school administrators, we usually get more done quickly with a phone call. Counselors, if they appreciate the

program, can be a very efficient way to schedule times to meet with classes because they have more consistent access to teachers than we do.

3.6 What to do after you have made contact

At this point, a teacher has contacted you and would like to schedule a visit. Now it is time to narrow down the time to one specific day and schedule presenters to do it. We typically use 2-3 presenters depending on how many presentations are scheduled during a day visit. Scheduling multiple presenters for a long day gives the presenters a chance to create a flow, pick up missing pieces if one of them momentarily forgets an important point, and have a time to rest during the visit (talking for 6 hours straight is draining). It is best to have a variety of days at least four weeks from the date the teacher contacted you. Appendix B contains an example email we might send to our presenters asking for volunteers to present at a local High School. Just to reiterate, you will want to have a consistent single point of contact to schedule the entire visit; this person will coordinate with the teacher and the presenters to make sure everyone understands what is happening and when.

3.7 Information to collect from the teacher

You will need the following information from the teacher to schedule a visit:

- When and where the presenters will meet the teacher?
- Is there a projector available for use?
- Is there Internet available? [If necessary for presentation/demo]
- How many presentations will we give? What kind of breaks there are between the presentations or are they back-to-back?
- How long should each presentation last?
- What is the nature of the audience for each presentation (i.e., grade level, subject area of the class, number of students, any other special information).
- Where can the presenters can park?
- What are the sign-in procedures for the school?
- If this is an all-day visit, will lunch be provided or will presenters need to bring a lunch? If so, is there a refrigerator available to store lunch items?
- If there is a specific group of students you want to address, inquire about meeting with these students during lunch, or before or after school for an informal Q&A session with presenters.
- Do students have access to computers? [For easy post survey administration]

3.8 Presenter preparation

Presenters should practice the presentation 1-3 times before going on the school visit. New presenters should practice at least twice. Seasoned presenters must practice at least once to re-familiarize themselves with the presentation. Presenters will need to practice on the exact equipment that will be used during the visit. A room and any necessary equipment must be reserved for the practice times. We typically schedule a practice for a two-hour block. Other presenters and organizers attend the practice to

simulate the audience and give feedback and advice. This is also a good time for new presenters to be introduced to the presentation and message you are trying to get across. Practice sessions should occur within the two weeks prior to the presentation.

During a practice session presenters:

- Set up the equipment
- Personalize the presentation
- Modify the presentation to suit audience and time slot
- Decide who presents each slide
- Practice the presentation
- Get feedback from other presenters

3.9 Travel issues

Presenters will need transportation to the school. Consult with your school's travel administrator to check on insurance. At IU, for insurance purposes and multiple other reasons we recommend using a rental car. Find out what the procedures for travel at your college or university are and be sure to follow them. There are likely different rules for in-state and out-of-state travel. At IU, we use the university motor pool service. Drivers must be 21 years of age to rent a car. This is usually not an issue for us, since most visits include a graduate student.

4 How to recruit and retain student presenters

4.1 Identify interested parties

1. Instructors are a good resource, especially for the intermediate undergraduate curriculum. They know their students, and will be able to identify undergraduates who may be interested.
2. Use existing social contacts. Encourage your current presenters to bring their friends to an introductory meeting
3. Get on your school's orientation schedule (this is especially helpful for graduate students). Give a presentation during orientation. This is especially effective if representatives of the student government help give the presentation.
4. Make the goals of the outreach program clear when you are giving the presentation.
5. For many students, this is a great resume/CV line. It gives opportunities to develop curriculum, be involved in their community and practice presentation skills. It will also give them a broader view of computer science and how it engages with society.
6. If your school has an Active or Service Learning program or a community service component, see if participation in an outreach program can fulfill some program credit hours for students.

4.2 Retaining presenters

1. Get the presenters invested in the presentation. Make it clear that they should make it their own. Giving the presenters ownership in the presentation and the organization will be the primary means of keeping them involved.
2. Listen to presenter feedback. If they say it is boring, don't contradict them, help them take the steps to make it better. This can include changing content, venue or target audience.
3. Compensation. Food, money and credit are three things that motivate all students.
4. Regular contact. Keep people in the loop, even if they are not on the schedule to give presentations. This may mean having presentation 'play' sessions where students can voice their specific concerns and work on building new content to address their concerns.
5. Keep the students in charge. The faculty should be involved in 'institutional knowledge' projects (such as websites and record keeping) but the students should be involved in recruiting, scheduling, and keeping things rolling. One exception to this rule is initial contacts. Sometimes, a professor or school representative might be better received as an initial contact. This will largely depend on the particular students you are working with. If you have the resources, then you can hire a work-study person to handle the details of booking and preparing for a visit so as not to over-burden your volunteers.
6. Set specific and realistic expectations. Many of our visits require an all-day commitment on the part of the student volunteers. We ask that each presenter try to present two times during the semester.

5 How to record your efforts

It is important to keep accurate records of your visits and disseminate the presenter feedback among all people involved in the program. This keeps everyone involved and helping to evolve the presentation and program. You will want probably want keep your department chair and your sponsors informed about the scope of your activities, particularly if you plan to ask for initial or continual funding.

5.1 Visit reports

Visit reports are a great way to keep everyone informed about what is happening. One of the student presenters writes the report shortly after a trip. It is nice to include observed demographic information, such as the number of students presented to and the age, gender and ethnic information. Record any problems encountered and how they were solved. It is also a good idea to mention any unusual questions from the audience. Publish the report on your internal web site and circulate it among the current group of presenters. Appendix C contains a sample report from a recent *Just Be* presentation written by the student presenters.

5.2 Teacher feedback

Be sure to get feedback from the teacher who hosted the visit. This is best done on the day of the presentation by asking them to fill out a written survey. Many times the teacher will provide a very positive quote which you can then ask for permission to include on your website as a "testimonial". It is also a nice idea to write a personal thank you letter to the teacher. In a year or two, you may want to schedule another presentation with the same teacher, so you want to leave them with a good impression of your professionalism.

5.3 Annual Report

An annual report is a good way to synthesize and analyze the visit reports gathered throughout the year. The numbers from the visit reports make for really nice data to compare growth from year to year. This is an excellent resource for arguing for more funding or recognition in your department, school, and community. The 2006 Annual Report of *Just Be* is in Appendix D.

6 How to assess your program

The Good. Assessment is an important step to show yourself, presenters, your school, potential donors, and peers what kind of impact your outreach program is having. It also helps give insight on how to improve the program and possible future outreach directions.

The Bad. Unfortunately, assessment is also time-consuming to create, administer, and evaluate. In addition, publishing results from assessments is tricky because Institutional Research Board (IRB) approval is needed when publishing findings about the assessment of people. At IU and CU, we have found that to publish assessment data about people less than 18 years old (e.g., K-12 presentation attendees), we must receive parental approval prior to the presentation. This is, of course, time-consuming for the presentation organizer and teacher who has to administer and collect the forms. Any child who does not have parental approval is not allowed to watch the presentation because the presentation is now seen as a study instead of a simple presentation about computing. Since we want all children to see our presentation, we decided not to publish data on our K-12 student presentation attendees.

The Work-around. We do administer pre- and post-questionnaires to students for our own internal use. We can show these results internally to our school administrators and fellow presenters. We also administer pre and post questionnaires for teachers that we can publish the results on with IRB approval. In addition, another work-around that can get IRB approval is to have a person trained in ethnography or evaluation sit in on the presentation and observe the student interaction with the presenters. The observational notes can be anonymized and published. We have not tried the latter yet.

The Implementation. We recommend people who are interested in assessment of their program work with a person in computing who does human computer interaction or someone from the social sciences or education to assist in the design of appropriate assessment materials. We have also included some example pre- and post-questionnaires in Appendices G and H. We have listed some forms of assessment that can help evaluate an outreach program below:

- Conduct pre- and post-questionnaire/surveys with teachers and/or students
    - You can modify pre-created computing/engineering surveys available here: https://www.engr.psu.edu/awe/

- Conduct pre and/or post focus group with a select group of teachers and/or students

- Invite an ethnographer, sociologist, education psychologist, or human computer interaction researcher to an outreach presentation so they can observe the affects of your outreach program.

- Invite social science, education, and computing experts to conduct an expert

review on your outreach program to see how you can internally improve the program, content, interaction style with audience members. Share your initial program, expert review findings, and redesigned program with fellow outreach people via publication, workshop, or website.

- We will be presenting a version of our *Just B*e program to IU students enrolled in a freshmen-level Computers and Society course. Anticipated attendance is approximately 400 students, many of which might be interested in taking a further computing class if they were better informed about their options. The timing of the presentation coincides with the start of registration for the fall semester so that the students will find the information immediately relevant and it will be fresh in their minds when choosing their classes.

  The course professor is allowing us to conduct a pre- and post-survey to assess changes in attitudes or course plans that may result from our presentation. We are pursuing IRB approval for this study. The surveys will be administered online. Here is a link to the information page:
  http://www.cs.indiana.edu/~jcottam/justbe/info.html

7 Mini-budget: how much things cost

7.1 At Indiana University

Staff: *Just Be* was created in 2004 by two women graduate students in the newly formed Women in Computing (WIC) group. During the first two years, all school visits were arranged and presented by students, working on a volunteer basis. WIC had received modest start-up funding from Microsoft and two campus units, the department of Computer Science and the Office for Women's Affairs, and a portion of these funds was used to cover travel expenses. The first year of the program, students drove their personal vehicles (not recommended) and were reimbursed for mileage and meals.

Beginning in fall 2006, the Computer Science department dedicated staff resources to the project when Laura Hopkins became the Outreach Coordinator. Laura spends 20 – 25% of her time on outreach activities.

Honorarium: In the beginning at IU, presenters were only reimbursed for travel to presentations and food expenses. The Women in Computing group provided money for two dinners during the school year for presenters to meet and discuss the presentation.

This year we have started paying our student presenters a small honorarium for each visit. The amount is posted to the student's bursar account in the form of an award. This avoids the paperwork involved in hiring the student as an employee and the amount is not taxed as income.

- Long trips, up to two hours driving distance from IU, 5 – 8 presentations throughout the day, usually three presenters. Each presenter receives $50.
- Local trips, in and around Bloomington, usually less than 4 hours total time commitment, two presenters. Each presenter receives $30.

Car rental: We provide a rental car for all visits, including local visits. The cost of a one-day rental from the university motor pool is about $50.

Lunch expenses: For longer, all-day visits, we will reimburse each student for lunch, usually $6 - $10.

- Approximate total cost of one all-day visit: $230
- Approximate total cost of one half-day local visit: $110

Materials and supplies: most of the time, we use the computer science department printers for our materials.

- Printing *Just Be* brochures: $300
- Printing *Just Be* bookmarks: $25
- Mints for give-aways: $450

Snacks at recruitment sessions: $50 per semester

Work study person to help schedule visits: $100 per week
Invest wisely. Hire a responsible individual who can work with minimal direction and who has excellent communication skills. In the past, we have hired undergraduates to work specific hours, but this has not worked out very well. This semester we have a Ph.D. graduate student, who has a deep interest in pedagogy and has good technical skills. He is paid $12/hour for up to 8 hours per week and is worth every penny.

Ask and you shall receive. We have received donations of swag (freebies like flashing pins, t-shirts, pens, etc.) from Google, Microsoft, and Intel, which we distribute to the young people we present to. Initially, eInstruction loaned us a clicker system and then later donated it to our program. We inherited a laptop, which is dedicated to our presentation, from a CS professor. Another professor had some extra funds in a grant that was about to expire, which is how we came to own a portable projector.

Currently, our operating funds are provided through a diversity initiative in the School of Informatics at Indiana University. We are exploring other funding opportunities with Indiana corporations.

7.2 At University of Colorado

Staff: Beyond Computing was developed by three professors on the Diversity Task Force departmental committee. We sent out one bulk email asking for 2-3 slides from each faculty member describing their work and received slides from over 50% of the faculty! We got over 70% of the faculty to participate by sending specific emails to people (e.g., "We loved your presentation on X and think high school students would love to learn more about it. Please send us 2-3 slides from that presentation.") Three students have also signed up and helped develop material for the presentation. Two professors do scheduling and coordination.

Honorarium: At CU, we do not have a budget, so a professor drives the students to the venue and treats the students out-of-pocket for a meal or snack.

Lunch expenses: CU professors pay for student presenter lunches.

Materials and supplies:

Printing Beyond Computing business cards: $10
See Appendix F for an example of a letter CU sent to iClicker asking for a donation. They responded positively and we should receive the clickers shortly.

Snacks at recruitment sessions: N/A

Work study person to help schedule visits: N/A

8 How to promote and propagate your program

Getting the word out about your program happens in three ways - (1) let people at your own college or university know what you are doing and they will most likely talk to other people at different colleges and universities about what you are doing; (2) let people at other colleges and universities know what you are doing by publishing/attending conferences and visiting their schools; and (3) create mini-workshops to show interested parties how to create an outreach program.

Here are a few ways to help get the word out about your program:

- Publish experience reports, qualitative/quantitative findings at conferences/workshops/university technical reports.
- Attend diversity conferences or conference tracks dealing with diversity and talk about the work you are doing.
- Invite students, professors, and administrators at your university and local universities to come and see your program.
- Volunteer to present your presentation at local universities and let them know you are available to help them create a program.
- Invite local universities who have established or are interested in starting an outreach program to your university for a discussion of how to start a program, keep it going, and how to coordinate your efforts (e.g., could you share one work-study?)
- Organize a small workshop to show people how to create an outreach presentation similar to the one you attended today
    - Indiana University's first workshop was held for approximately $200
        - Printed materials on department printers for free
        - Used departmental classrooms during the weekend for free
        - Got bagel donations for breakfast, but has to buy juice and yogurt
        - Paid for participants lunch at local restaurant

9 Staying connected and getting help: Outreach KIT

You can grow an outreach program from very humble beginnings. After a time, you will have a vibrant and sustainable program, but you may encounter difficulties along the way. We would like to continue to work together with you and help you overcome any problems you may encounter as you get your program started. We would also like to capture your experiences so that others can follow in your footsteps. In order for us all to share our programs, our experiences and to learn from each other, we have created a collaboration website, called Outreach KIT.

http://moodle.cs.colorado.edu/course/view.php?id=77

You can view the site, without logging in, by pressing "guest login". When you registered for a new account, an email will be sent to you with a link asking for the enrollment key. The enrollment key is:

BringITOn

Please create an account, fill out the survey, and then add an entry about your particular program.

10 Resources and information

Here is some useful information to help get you connected with the happenings of outreach in the computing world!

10.1 Existing K-12 outreach programs at colleges and universities

- Indiana University – *Just B*e, an interactive experience created by the Women in Computing group at Indiana University-Bloomington in 2004. The goal of the interactive experience is to break common stereotypes about people in computing. http://www.cs.indiana.edu/cgi-pub/wic/outreach

- Rice University – CSters – outreach program initiated by the Women in Computer Science group in 2006. http://www.ruf.rice.edu/~csters/outreach.htm

- University of Colorado at Boulder – Beyond Computing was created in 2006. For more information, contact Katie Siek, ksiek@cs.colorado.ed.

- Carnegie Mellon University – Women@SCS – originated the Roadshow idea in 2003, http://women.cs.cmu.edu/What/Outreach/

- Purdue University – Student Outreach for Computer Science (SOCS) sends current CS students to speak to school administrators, teachers, and students about different computing-related careers and the courses students should take to prepare themselves to study computer science in college. http://www.cs.purdue.edu/external_relations/k-12_outreach/

- Simon Fraser University – Women in Computer Science (WCS@SFU) has an outreach program to local schools, http://cgi.sfu.ca/~wics/

- University of Illinois at Urbana-Champaign (UIUC) – information on "Chic-tech" for high school girls, the Games4Girls Competition, and other outreach initiatives. http://www.cs.uiuc.edu/outreach/

- University of Texas at Austin's Computer Science Roadshow, presentation available at http://www.cs.utexas.edu/~coonske/Presentation.ppt. For more information, contact Tiffany Grady, tgrady@cs.utexas.edu.

- University of Victoria – outreach presentations to high schools girls in the Victoria area. Presentations include an emphasis on what CSC is, and what one does in a CSC degree, as well as imparting the diversity of careers that are available to women in Computer Science. http://wcs.csc.uvic.ca

10.2 Web resources for creating your outreach program

- "Computer Science Unplugged" – an interesting video of a presentation by Tim Bell, professor of Computer Science and Software Engineering at the University of Canterbury in Christchurch, New Zealand, about teaching Computer Science

topics, even without computers. http://video.google.com/videoplay?docid=-5129662873097337591&q=%22computer+science+unplugged%22

- Alice – A visual programming language created at Carnegie Mellon to expose young students to the basic ideas behind Computer Science. Rice University used Alice in their presentation at the Sally Ride Science Festival. http://www.alice.org/

- EDU-SIG: Python in Education – a website containing helpful resources for those interested in using the Python programming language when introducing Computer Science topics http://www.python.org/community/sigs/current/edu-sig/

- The Python Challenge – the first programming riddle on the net. This is a very interesting website in which the player must write short programs to solve the riddles and progress levels. We believe, that with adaptation, this approach (using simpler riddles) has potential as an exciting way to challenge students with the logic needed in Computer Science. http://www.pythonchallenge.com/

- Curriculum for Middle School Camp at Georgia Tech/ICE (Institute for Computing Education) – zip files of powerpoints and word documents that help people put on summer camps for middle school students and encourage them to think about computing in a positive way http://coweb.cc.gatech.edu/ice-gt/447

- The Ada Project – a collection of links to other online resources for information and resources related to women in computing. http://women.cs.cmu.edu/ada/

- Georgia Tech/ICE (Institute for Computing Education) – a powerpoint presentation on Computer Science for high schoolers and undergrads with movies in order to get students interested in computer science and bust the myths (no jobs, boring, must love computer games, etc). http://coweb.cc.gatech.edu/ice-gt/135

- Computer Girl – "a bridge from high school to the computer world" http://www.computergirl.us/

- NETS for Students, Teachers, and Administrators by the International Society for Technology in Education – three sets of standards for teachers and administrators of students grades K-12 describing what students, teachers, and school administrators should know and be able to do with technology. http://cnets.iste.org/

- GirlTECH, Getting Girls Interested in Computer Science – a page maintained by Cynthia Lanius of Rice University. http://math.rice.edu/~lanius/club/girls.html

10.3 Hardcopy resources for your outreach program

- ACM Computing Degrees and Careers brochure – provides information on

computing degrees and possible educational pathways for senior high school students and parents

- The New Educational Imperative: Improving K-12 Computer Science Education from the Computer Science Teachers Association – a publication created to provide policy makers and educators with a better understanding of why K-12 computer science education is educationally and economically essential

- Careers in Computing Poster created by the Computer Science Teachers Association – a 2x3 ft. full-color classroom poster encouraging middle school and high school female students (especially members of under-represented minorities) to pursue careers in computing

- Girls Incorporated Online Folder – a 9 x 12 four color folder with inserts that introduces girls ages 9-17 to an online community that promotes learning and success

- Girl Scouts Explore Science, Technology, Engineering & Math (STEM) – a booklet that highlights successful Girl Scout STEM programs and collaborations for Girl Scout adults, educators, partners

- Outreach-in-a-Box: Discovering IT by National Center for Women & Information Technology – a classroom presentation including slideshow and program guide that aids industry and university computer science professionals in outreach efforts; making middle school students, especially girls and underrepresented minorities, aware of opportunities in IT

- IT is Here created by NCWIT – printed material emphasizing the importance of IT and diversity of thought in innovation

- Science Can Take Her Places! created by Sally Ride Science – a 9" by 7" booklet (also available in Spanish) to help parents of girls in grade 4 encourage their daughter's interest in math, science and technology

- Totally Amazing Careers in Engineering – a 9" by 7" booklet for middle school students that profiles scientists in different engineering careers and provides accompanying activities

- What Do You Want to Be? Explore SpaceScience by Sally Ride Science – a 22" by 34" poster for K-12 students, teachers, and parents that shows the path of 12 female space scientists from childhood to present day careers

Appendix A: Example of an interest follow-up letter

Here is an example letter that we would send to a teacher or counselor who we met at a conference and who expressed interest in scheduling a *Just Be* visit. Information specific to our *Just Be* program is indicated by <>.

> Dear -teacher's name-,
>
> Thank you for your prior interest in <WIC@IU's *Just Be*> interactive presentation. We are currently scheduling presentations for the remainder of this school year. The <*Just Be*> presenters are very excited to bring our presentation to your school. If you would like to schedule a visit, please fill out the following <web> form and we will get back to you:
>
> <http://www.cs.indiana.edu/cgi-pub/wic/outreach/outreach_contact.php>
>
> For more information about <*Just Be* and to read the bios of the *Just Be* presenters>, please visit our website:
>
> <http://www.cs.indiana.edu/cgi-pub/wic/outreach.php>
>
> Thank you again. We're looking forward to working with you. If you have any questions, please contact <Laura Hopkins> (contact information below) to discuss hosting <*Just Be*> at your school.
>
> Sincerely,
> The <*Just Be*> Team

Appendix B: Presenter contact letter to schedule a visit

Here is an example of a letter that we sent to our pool of presenters to identify volunteers who were available to go to two specific high schools we were in contact with. It is a good idea to provide as much information about the visit being scheduled as possible. We recommend using a single contact person to communicate with the school representative and with the presenters. It is also a good idea to set up a separate email account as a repository for all such communications.

> Hello *Just B*e Presenters,
>
> First of all, we've created the just-be-all@cs.indiana.edu mailing list to help us better communicate.
>
> Second, we are currently trying to schedule presentations at two local Bloomington high schools: Bloomington HS South (BHSS) and Aurora Alternative HS.
>
> The BHSS visit will consist of two 45 minute presentations, one at 8am and one at 9am. BHSS is located at 1965 S Walnut St, which is about about two miles (a ten minute drive) from campus. We will rent an IU vehicle, which you will pick up the night before, for your travel. Please let me know your availability on the following dates to visit Seth Pizzo's classes at BHSS.
>
> - Wed, Mar 29
> - Wed, Apr 5
> - Wed, Apr 12
>
> Aurora is located at 524 N. Fairview St., just over a mile from campus. We do not yet have specific dates for the Aurora visit, but it would be helpful in scheduling this and other visits if you were to send me your general availability through the end of May. (I realize that this date extends past the end of this semester, but remember that K-12 schools end later than IU.) Please be as specific as possible about your availability.
>
> Maps for BHSS and Aurora are attached.
>
> Please reply to IUJustBe@gmail.com, not to me directly and not to the entire distribution list.
>
> Thanks,
> - your name -

Appendix C: Example of a school visit report

Here is an example of a report from a recent *Just Be* visit at an Indiana High School. It was written by the students who presented.

> Paul, Adity and I (Sriram) had a *Just Be* Presentation on the 28th of November 2006 at Bloomfield High School, Bloomfield, Indiana.
>
> **The facts:** We presented four times as a part of the career and accounting class. We spoke to about 100 freshman (based on a rough count, about 30 girls, 70 boys). The time available for presentation was a bit lesser than the normal *Just Be* presentation times. Three of the presentations had to be curtailed to 30 mins or lesser while the fourth one was for about 50 minutes. The presentations in general went well and the students interacted quite a bit and had fun during the presentations.
>
> **The timing problem:** The first presentation could have gone better, as we were told about 5 minutes before the presentation started that we had about 30 minutes to complete it. The time was further reduced as the Principal had some announcements to make. We had to improvise and as a result, we couldn't get through all the slides and we had to give an impromptu conclusion towards the very end. We went through all the CPS questions, but did not do all the "what can you do with computing slides" and stopped at Sudoku. At that time this seemed to be the best thing to do, as we felt they will learn better if there was more interaction.
>
> **Interaction with students:** The students were initially quiet, but after a while, (with some freebies) opened up and began to interact during the presentation. We had a 30 minute break after the first presentation and it gave some time to figure out how to condense the presentation to 30 minutes without losing the interactive component. As a result the next two presentations went quite well, with good interaction. We had a couple of students interested in math and computer science who responded to the central them that they could "Just Be" themselves and still be in CS/Math. The final presentation was for a full hour and it was the best of the lot. It really helped to have a kid who wanted to contradict everything we said. We could play off him and get the class involved and communicate the point better.
>
> **Suggestions:**
>
> 1. Do not wear formals (esp Khakis) when you do Just Be Presentations. Students seem to think that is mostly what Geeks and nerds wear and we seemed to fit the stereotype. It is better to be dressed casually as it seems to put students at ease.
>
> 2. Have a 30 minute version of the presentation.

3. Have more diversified content, currently the content seems to have a bias towards graphics and game design. We should put some more stuff in. Paul's research with voice technology etc.

4. Change the CPS questions (at least the pictures), to include something newer and trendier, maybe a picture of Larry Page as the founder of Google.

Appendix D: Example of an annual report

Annual Report on the Status of *Just Be*
June 2006

2005-06 was a productive year for *Just Be*. We presented at four Indiana high schools to nearly 350 HS students, including about 250 girls.

- Edgewood HS in Ellettsville (~100 students, half girls)
- Bloomington HS North (~20 freshman -- 5 girls -- at Career Day)
- Bloomington HS South (~25 boys)
- Pike HS in Indianapolis (~200 girls)

This summer we have visits at two summer camps and one science fair:

- Intel Science Fair in Indianapolis
- Informatics Summer Camp (~35 girls and minorities)
- Girls Incorporated in Indianapolis (~40 girls)

We have also presented *Just Be* at four Indiana conferences and at one national conference (Munger).

- Java Engagement for Teacher Training (JETT)
- Indiana Computer Educators (ICE)
- Indiana Women in Computing (InWIC)
- Computing Outreach in INdiana (COIN)
- Paul Munger Conference for Youth-Serving Professionals

Our paper on "Breaking the Geek Myth" was published in Learning & Leading with Technology in April 2006.

Current Presenters
Samantha Foley, Computer Science, will be taking over from Katie Siek as the *Just Be* chair for 2006-07.

Graduate students:
Joseph Cottam, Computer Science*
Jennifer Franko, Mathematics
Tonya Stroman, Informatics*
Tammy Toscos, Informatics*

Undergraduate students:
Diane Cessna, Computer Science
Acacia Davis, Computer Science

* indicates new presenter

Five experienced presenters have graduated: Katie Siek, Amanda Stephano, Jacki Bauer, Tiffanie Shakespeare, Kristy Streefkerk. This leaves a huge hole in our lineup and we will have to work hard to get more student volunteers interested in becoming *Just Be* presenters.

Fall Plans

We are in contact with teachers at BHSN, Aurora HS, Batchelor Middle School and East Columbus HS about scheduling *Just Be* presentations in the fall.

We are working with Jasmine Pagel to create a brochure for teachers that describes *Just Be* and invites them to contact us to schedule a visit. The brochure should be printed by the beginning of the Fall semester and we plan on mailing the brochure to teachers on our contact list.

Just Be will be an integral part of the diversity workshop - Bring IT On! - for students from HBCUs. Presenters will also lead a Teach the Teachers session at the Midwest Celebration of Women in Computing (MidWIC) conference. One of the things that separates *Just Be* from other outreach programs is that we are interested in teaching others how to start outreach programs to increase diversity in computing.

Equipment

This has been an excellent year in terms of equipment donations. We have been fortunate to receive a used PowerBook G4 from David Wise, which means we now have a dedicated laptop that runs our presentation. Dennis Groth donated a brand new Dell portable projector, which will give us much greater flexibility in scheduling our practice sessions and going on day-long trips. Microsoft donated three Pocket PCs, which we will use as props during the presentation, and eInstruction donated the CPS response system that we've had on loan for the past two years.

Note: this equipment may require service and maintenance in the future and we should include a line item in the WIC budget to cover such costs.

Challenges for 2006-07

We need to greatly expand our pool of presenters and develop more and better tools for training the new presenters.

We need to encourage students to develop new slides for the presentation to keep it fresh and up to date.

We need dedicated faculty advisors to be proactive in arranging school visits, organizing the trips, (occasionally) accompanying the students on the visits, and following up with the teachers.

We need to devise a mechanism for evaluating the impact of *Just Be*.

Appendix F: Example teacher feedback form

We ask each teacher who views our presentation to fill out a feedback form. Here is an example of the questions we asked and the responses we received from one teacher.

WIC
Indiana University Just Be Feedback

Contact Information:

Benjamin Csikos
Business Teacher
Pike High School
Benjamin.Csikos@pike.k12.in.us
317-387-2709

1. What do you think is the central theme of *Just Be*?

The central theme of *Just Be* is to inform young women the opportunities available in the field of information technology (IT). *Just Be* also extinguishes the stereotype of a person in the IT field.

2. What did you learn from the presentation?

I personally learned about different fields within IT. Many of these fields do not include programming or networking.

As for my students, they also learned about different majors in college and careers within the IT field. They also were quite surprised that women can have such an important role in IT. Many had the stereotype in their mind of the "nerdy guy" that sits in a cubical all day and does nothing but program computers, and that stereotype was squashed after the presentation.

3. How can we improve *Just Be*?

The presentation was wonderful. It touched on many different aspects of IT and encouraged women to enter into the field.

4. Are there any additional topics, fields, or information we should cover in our *Just Be* presentation?

Discussing the different career choices in IT really helps high school students understand that IT is not only programming and networking. High school students are all about FUN, and incorporating this concept into the different careers helps them connect.

Many students are very interested in video game design. If there is anything that *Just Be* could present on this, it would be very beneficial.

5. Did you like the interactive part of *Just Be*? How easy was it to use the eInstruction voting modules?

The interaction was great. The eInstruction was something that all students enjoyed. They liked to interact without having to speak out. Having high school students interact like you did helps to keep their attention longer.

6. Would you be interested in hosting *Just Be* at your school?

I am very glad that we hosted *Just B*e at Pike High School!! Our enrollment in our Academy of Information Technology (AOIT) had an increase of women after the presentation. I would like to contribute this increase to the *Just B*e presenters. The importance of IT in the world today is huge, and with presentations like this one; women are again placed on the same playing field as men. It is "cool" for women to work with technology

I would love to have the *Just B*e presenters back at Pike High School next school year. I will make sure I am in contact with you as soon as we figure out our schedules for next year. Thank you for taking time out of your busy schedules to present to our students. Everything was presented with great poise and enthusiasm! Great Job!!

Appendix F: Request for donation letter

CU is using iClicker as the official clicker of the CU campus. The following paragraphs were sent to iClicker to request a donation to the new outreach program and they responded positively.

> Currently only 7% of 4th year undergraduate computer science seniors are women at the University of Colorado at Boulder (CU). Even more concerning is that there are currently no sophomore or junior women majoring in computer science. This problem is not limited to CU since only 14% of women receive undergraduate computer science degrees nationally. Fortunately, 67% of CU's student body is from the state of Colorado, giving the Diversity Task Force in the Department of Computer Science an opportunity to attract more women to the program by reaching out to local K-12 schools and introducing both girls and boys to interesting fields in computing.
>
> We created an interactive presentation called "Beyond Programming" to get students interested in science and technology that is loosely modeled after Carnegie Mellon University's (CMU) "Outreach Roadshow" and Indiana University's "Just Be" program. The presentation includes an introduction of the undergraduate presenters, an interactive component where audience members vote in polls that challenge personal stereotypes about computing, a discussion of computer science curriculum, an overview of interesting fields of computing to spark students' interests, and fun puzzles giving students insight into skills necessary to succeed in computing. The presentation can be modified to be appropriate for any K-12 age group.
>
> The voting polls and puzzle-solving in our presentation is done by raising hands and calling out answers. For a presentation espousing the virtues of computing, we do not have the means to let students interact with technology during the presentation. Indiana University has published articles discussing how much fun students have using clicker technology such as eInstruction modules during outreach presentations. We hope to integrate such technology into our own presentation. Since iClicker is the front-runner to be the standard platform for the entire CU campus, we hope that iClicker could donate 50 clickers and a transponder to our group for presentations so students have the opportunity to confidently interact with technology. We will mention iClicker on our website, in future publications about Beyond Programming, and distribute iClicker advertisements to K-12 schools we visit as an acknowledgment of your generous donation.

Appendix G: Example pre-survey for assessment

University of Colorado Computer Science Outreach Questionnaire

1. Gender ☐ Female ☐ Male

2. Class Year: ☐ Fresh. ☐ Soph. ☐ Junior ☐ Senior

3. Ethnicity (Check all that apply):

- ☐ Black/African/Haitian American
- ☐ Asian & Pacific American
- ☐ White American
- ☐ American Indian/Alaskan Native
- ☐ Latino/Latina/Hispanic American
- ☐ Other _____

4. From the list below, check the classes you are currently taking in school this year.

- ☐ English
- ☐ Algebra 1
- ☐ Algebra 2
- ☐ Pre-Calculus
- ☐ Calculus
- ☐ Chemistry
- ☐ Physics
- ☐ Foreign Language
- ☐ Computer Applications
- ☐ Computer Science
- ☐ Drafting or Computer Aided Drawing (CAD)
- ☐ Other math, engineering, or science classes
- ☐ Other _____

5. What is computer science?

6. In what ways does computing interest you?

7. What do you think computer scientists do? Check the two sentences from the list below that best answers the question.

- ☐ Computer scientists mainly work on machines and computers
- ☐ Computer scientists work with other people to solve problems
- ☐ Computer scientists have lots of choices about what they can do in their jobs
- ☐ Computer scientists mainly work on things that have nothing to do with me
- ☐ I don't know what computer scientists do
- ☐ Other: _____

8. Are you interested in exploring computer science as a possible study / job choice? ☐ Yes ☐ No

9. I would like information about CS at CU-Boulder Email Address:

10. What is the chance you will major in computer science in college?

☐ 0% - No Way ☐ 25% ☐ 50% ☐ 75% ☐ 100% - Definitely

Appendix H: Example post-survey for assessment

University of Colorado Computer Science Outreach Questionnaire

1. Gender ☐ Female ☐ Male

2. Class Year: ☐ Fresh. ☐ Soph. ☐ Junior ☐ Senior

3. Ethnicity (Check all that apply):

- ☐ Black/African/Haitian American
- ☐ Asian & Pacific American
- ☐ White American
- ☐ American Indian/Alaskan Native
- ☐ Latino/Latina/Hispanic American
- ☐ Other _____

4. What is computer science?

5. Did anything in the presentation surprise you about computing? If so, what surprised you? If not, please tell us how the presentation met your expectations of what computing is.

6. What do you think computer scientists do? Check the two sentences from the list below that best answers the question.

- ☐ Computer scientists mainly work on machines and computers
- ☐ Computer scientists work with other people to solve problems
- ☐ Computer scientists have lots of choices about what they can do in their jobs
- ☐ Computer scientists mainly work on things that have nothing to do with me
- ☐ I don't know what computer scientists do
- ☐ Other: _____

7. Did you discuss the *Beyond Computing* presentation with anyone? If so, please check all that apply:

- ☐ Friends
- ☐ Sibling
- ☐ Parent
- ☐ Teacher
- ☐ Councelor
- ☐ Other _____

8. What is the chance you will major in computer science in college?

☐ 0% - No Way ☐ 25% ☐ 50% ☐ 75% ☐ 100% - Definitely

9. Would you recommend this presentation to your friend?

☐ No Way ☐ Kinda ☐ Sure ☐ Yes ☐ Definitely

10. Would you recommend that your teacher have this presentation next year?

☐ No Way ☐ Kinda ☐ Sure ☐ Yes ☐ Definitely