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Introducing young women to CS, and supporting advanced research environments

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Introducing Young Women to CS, and Supporting Advanced Research Environments

Joel Adams talks about starting a chapter of Girls Who Code, while Daniel A. Reed considers an issue with cyberinfrastructure.

Joel Adams
"Launching a New Girls Who Code Chapter"
http://bit.ly/17zt0X2
February 1, 2015

Our CS department recently launched a new Girls Who Code (GWC, http://girlswhocode.com) chapter. GWC is an after-school-club outreach that strives to introduce girls in grades 6–12 to computer science. Its goals include helping girls develop algorithmic thinking skills that can open up computing-related careers, helping them see how CS is relevant in today's world, making friends with other girls interested in technology, and having fun!

To achieve these goals, GWC provides a project-based curriculum with three levels. In each level, the girls use different technologies to complete a series of challenges, each of which introduces one or more new level-appropriate computing concepts. The curriculum is organized by semesters, and in addition to weekly challenges, the girls work their way through projects each month and semester.

Our new chapter has generated some media coverage which led to inquiries from others interested in launching a GWC chapter, so I thought it might be helpful to enumerate the steps needed to launch a chapter:

1. Find an organization willing to **host** the meetings; it should have a space with computers and projection facilities. A computer lab designed for instruction can work well, at a high school, college/university, library, or non-profit organization. The Calvin College Department of Computer Science (http://cs.calvin.edu/) is our host organization.

2. Find a person from that organization willing to serve as the chapter's **advisor**. This person will be the liaison between the chapter and the organization, reserving space for meetings, arranging for access, and other local logistics. I am our chapter's advisor, so this was easy.

3. Find one or more **instructors,** volunteers knowledgeable about software development (having taken at least three college-level CS courses) and, ideally, women. I contacted several of our recent female CS grads working locally as software developers. One volunteered to be the lead instructor, and she recruited a female co-worker to help her.

4. Find a club **president**, who will submit the online application to launch a new GWC chapter, and will help to recruit other girls. This should be a female student (ideally high school, but middle school could work) proactive and motivated to learn about technology. I recruited an outstanding high school junior who had worked for me in our Imaginary Worlds Camps (http://alice.calvin.edu/iwc/).

5. Schedule **meeting times** in consultation with the instructor(s) and president. Find a time convenient for as many participants as possible. We chose to meet in the evenings, because many girls participate in other activities after school. The GHC curriculum requires eight hours of contact time per month, so we scheduled our club to meet for two hours each Monday evening.

6. Publicize the club to recruit **students**. We contacted local high schools, companies, community partners, and related outreach efforts (such as BitCamp, http://bit.ly/1alfnwx) to spread the word.

In #4 above, I mentioned our Imaginary Worlds Camps, one-week computing animation camps I have been directing each July since 2003. A week is too

short a time to build mentoring relationships with the students; students come for a week, learn some things, and we never see the majority of them again.

One of the most promising things about GWC is its potential to build sustained mentoring relationships between our instructors and these young women. Compared to a one-week camp, I believe the GWC weekly format holds much greater potential to mentor these young women and get them excited about technology. This is what motivated me to launch our GWC chapter.

It took time to get our club off the ground. After deciding in summer 2014 to pursue this, I recruited our club president and lead instructor in August, then the president had to submit the new chapter application. After that was accepted, I had to complete a form outlining my responsibilities as advisor, and our instructor had to complete a qualifying quiz to show GWC she had the necessary computer science knowledge. After GWC approved our new chapter, we could decide when to meet, set a launch date, and so on. We then began publicizing the chapter and recruiting students. As this was happening, our instructors worked through instructor-training materials GWC provides for its curriculum.

GWC recommends starting new chapters in January or September. We set our launch date for the second week of January, and our instructors created an online signup form to get some idea of how many girls they could expect (and how many snacks to buy). Twenty-one girls signed up, and 23 girls showed up for our first meeting! Attendance has stabilized at about 20. GWC recommends a minimum of five girls for a chapter, and a student:instructor ratio no greater than 20:1.

The girls in our chapter are enjoying themselves, and their parents are very appreciative. I received this note from a parent the day after our launch:

My girls, surly and whining, didn't want to go to GWC last night. Two hours later, smiling, excited, they couldn't stop talking. "I can't wait to work more in Scratch, you should see what I made; I think Scratch is already on my computer." Thank you for making this possible.

We think GWC holds life-changing potential for the young women in our chapter. While we hope some of them pursue computing-related careers, we believe the algorithmic thinking skills they acquire will be beneficial no matter the career path they choose.

GWC is just one of many organizations seeking to catalyze change. If you have direct experience with other organizations that seek to bring greater diversity to our technical workforce, tell us about your experience. If you are interested in launching your own GWC chapter, I strongly encourage you to contact GWC and do so. Good luck!

Daniel A. Reed
"Lessons from Winnie the Pooh: Sustainable Cyberinfrastructure"
http://bit.ly/1ulMju3
Nov. 16, 2014

In his 1928 children's book *The House at Pooh Corner* (http://bit.ly/1BZaN2L), A.A. Milne introduces us to Tigger, a tiger (and friend of Winnie-the-Pooh) with unusual tastes and behavior, who lives in the Hundred Acre Wood (http://bit.ly/1vBYQh9). Disney brought Tigger to animated life in the 1968 movie *Winnie the Pooh and the Blustery Day* (http://bit.ly/1JQmz3C), in which Tigger sings the song "The Wonderful Things about Tigger," noting, "the most wonderful thing about Tiggers is I'm the only one. Yes, I'm the only one."

All too often, I find myself thinking about Tigger during conversations about cyberinfrastructure (http://bit.ly/1FYGPNI), the computing, storage, networks, software, and staff who support research data archives and computing systems. Why, you might ask? It is because we find it difficult to *replicate and sustain* cyberinfrastructure, whether at the international, national, regional, or campus levels, for the long periods needed to preserve digital artifacts and to reap the benefits of cross-disciplinary, longitudinal data fusion and multidisciplinary modeling. Each deployed system is like Tigger; it is the only one, unique in its characteristics and capabilities.

Paradoxically, the rapid ferment in computing is both a benefit and a hindrance. The benefits of change are obvious, yielding a cornucopia of new consumer devices and rich cloud services; an unprecedented scale and richness of data, made possible by high-resolution scientific instruments, social media and e-commerce interactions, and a dizzying array of environmental and biological sensors; and higher-performance computing (HPC) systems of ever-rising performance and capability. Every year, what was new and exciting quickly becomes passé, obviated by new technological innovations.

The hindrance of computing change is less obvious, but real. Any deployment of data archives or computing systems is quickly obviated by newer technology with greater capacity and lower cost. However, the consequences of this change are far more serious and deleterious than mere technological obsolesce. They shape our research psychology, lessen our commitment to continued reinvestment and sustainability, and minimize the most important aspect of sustainable cyberinfrastructure, the cadre of experienced staff with institutional and historical context who operate that infrastructure.

In this, we in computing are unusual, if not unique. Most other capital investments presume a 10-, 20-, or even 30-year capital depreciation schedule. Rare is the computer system still in operation after five years. Rarer still is the research data preserved for use by other disciplines when the data ceases to have value to either the research team that produced it or cognate disciplines.

The latter is worrisome, because the longitudinal value of research data often accrues to disciplines other than those where it was created. This is equally true for scientific research and for multidisciplinary attacks on wicked problems (http://bit.ly/1EuvjI2) in environmental sustainability and climate change, healthcare and aging populations, economic disruption, and social change.

Tigger is not the right role model for sustainable cyberinfrastructure. We need a new model that judiciously balances investment between the "next big thing" and sustainable cyberinfrastructure, for the latter is itself a crucial enabler of discovery.

As Winnie-the-Pooh would say, "Oh, bother!"

Joel Adams is a professor at Calvin College. **Daniel A. Reed** is Vice President for Research and Economic Development, University Computational Science and Bioinformatics Chair, and professor of Computer Science, Electrical and Computer Engineering, and Medicine at the University of Iowa.