

Santa Monica College
Computer Science Advisory Board Meeting
May 30, 2014

Introduction

Department chair Fariba Bolandhemat opened the meeting by welcoming everyone to the annual meeting and requesting suggestions on how we may more perfectly align our program with current industry needs. Many excellent ideas were put forth for new courses, additions to existing courses, important points to emphasize in our teaching, trends in industry, currently in demand skills, the current state of this rapidly evolving field, etc. The discussion has been organized below by topic.

Our dual mission

Our program has a dual mandate to 1) prepare students for transfer to a 4-year college (we do this well), and 2) train students on a career technical path – we need Advisory Board help with this.

State of the Economy

There is currently a huge gap between supply and demand for qualified people in this field. All companies have open head counts. There is a serious shortage of developers. One reason for this is the growing demand as money is shifted to software for increased automation of tasks.

On-shoring trend

There is a large onshore influx of jobs. Off-shore development has encountered difficulties – with data sensitivity, software quality, communication, project management, language, time, and cultural understanding. Projects are much easier to manage when workers are onsite. 70-80% of off-shore projects fail. Off-shore projects are more successful when workers live and work here for a while, absorbing the culture, and then return to their country. Onshore workers have the great advantage of cultural understanding. This takes a very long time to acquire. **Connected to this on-shoring trend is an ongoing need for networking technical skills. It is very hard to outsource the networking of the computer that sits on your desk. As such, the Networking Certificate program appears to be a good fit and should continue to be offered.**

Currently in-demand technical skills

Big Data

Huge datasets are being generated. For example, 50TB/hr. are being generated on Amazon. An exciting opportunity in this emerging field exists for data analysts to do data mining, performance optimization and management, analysis of high-volume datasets to determine public policy and costs, etc. There is a course at Rand for this. This holistic, multi-discipline science is becoming a more and more important skill and there is a shortage of qualified workers. NoSQL is often used. Lack of standards and no enforcement guidelines means we need guidance in designing a NoSQL course. Workers need an understanding of data structure, a foundation in Relational Database (RDB), and to know when to use an RDB or NoSQL.

Mobile platform

There is a growing demand in the mobile space. Users expect native apps to have a much more robust user experience (UX) than web apps. Mobile includes not only iOS and Android native apps, but also web apps.

Other Technical Skills

- Programmers need to have knowledge of the fundamentals of the ecosystems for the various programming languages. Programming is becoming easier and easier by leveraging these APIs. See the programming language websites to learn about these ecosystems.
- An ability to solve business problems by seeing the bigger picture.
- An understanding of when to use cloud computing vs. Virtual Private Enterprise (VPE).

Non-technical skills

Effective workers must be able to communicate well. This is why Ruby is getting popular. They need passion and confidence, and must be team players and artistic. We should try to inspire students to create their own project. The fact that students are not used to solving the whole problem is a big problem. They must be able to think on their own and understand that solving business problems is much more than just engineering or science.

Having a passion to learn and confidence are key things. One board member always had a project he was working on while in college, coding in the dorm room, learning to code quickly, participating in Top Coder contests, and so on. It doesn't really matter what the trend is. Just have your own project and be good at creating things.

Recommendations for new courses or additions to existing courses

- Big Data and NoSQL.
- A capstone/portfolio course where a client presents a real-world project to the class. This should be taken early in the sequence so the student has more ideas when taking later classes. In many of our courses, we do group projects with presentations that showcase our students' work. We would like to invite companies to attend these presentations. Dr. Dehkhoda's Java classes will do project presentations on June 7th in B207, with seven teams presenting. It was suggested that we make the presentations available online.
- A test-driven development course combined with security. Security is a principal concern in the enterprise. There is a growing demand for a "security first" approach. A certificate would be desirable.
- An emerging technology course that teaches leading edge stuff. It is a rapidly changing world. Advise students to learn a new language every month. Technology moves fast. Look to the future.
- There is a growing demand for expertise with embedded technologies, smart devices, wireless, smart homes, etc. Verizon is involved with this. We do have embedded systems and robotics courses.
- A cloud computing / Internet technology course where students architect end-to-end web apps and put them on the Internet. Amazon Web Services (AWS) is available for us. JS everywhere web apps have become increasingly popular and JSON is largely replacing XML for data representation.

- Add some Arduino and Raspberry Pi lectures to existing courses.

Preparing students to hit the ground running

- The most effective employees are people who have done a project that was their own idea rather than a class assignment. It should be something that they imagined, built themselves from beginning to end, and put on a public repository such as GitHub where prospective employers can view it.
- There is a gap between academic knowledge and the skills needed to solve real-world business problems. A possible solution is for industry mentors to present a real-world business problem for them to solve. Students would gain an understanding of the bigger picture, more of the software development lifecycle (SDLC), and a fuller perspective of real-world work context. One can gain an understanding of business by being around it. We do use business-like tables in database courses.

Career Technical Education (CTE) - Career Pathways

There is a formal context for industry/education partnerships – Career Pathways, a program designed with input from industry employers with \$250M in funding. At SMC, the Career Technical Education (CTE) department oversees our participation. We are in our third cohort of 25 students. The select grouping of courses includes business, job success, internships, mentors, and project-based learning. Community colleges are best suited to do this. The transfer rate is just below the normal rate and students have the additional advantage of career preparation. Many students already have BA degrees, but this gives them a relationship with an employer. Students can complete the 30-unit program in one year.

Internship Program

The SMC Career Services Center provides several resources including a jobs site to which only SMC students have access, and where companies can post openings. An internship class is offered every fall, winter, spring, and summer. This is a formal program in which students must complete 60 hours of work and learning objectives co-written by the student and the company. It is an online class taken on a pass/fail basis. Lisa provided handouts and information about SMC's internship and job posting program. Employers register for free on the website at www.smc.edu/jobs4u. Internships can be either paid or unpaid.

The Center also puts on a job fair in May which runs 3 – 4 hours and where companies can recruit on campus. We had participation by 60 companies this year. We need more CS companies. The Center also conducts a Cool Careers Forum Panel where speakers talk to students about careers in their field.

Accessibility

Universal Design principles should be taught so that apps are usable by the greatest number of users. We need to emphasize accessibility awareness, the use of available features, and testing and validation. This could be a separate course or could be integrated within existing courses, and should not be too late in the sequence of classes.

Input from student attendees

There should be more structure in the CS program from CS 3 upwards. There is too much review. Cover version control systems, Git, and system integration. Students posting homework publicly is a problem. We should provide a way for students to post their work and restrict access.

Other ideas presented

- Invite business CEOs to next Advisory Board meeting. They can provide valuable input for our program.
- The title *software writer* may be preferable to programmer, developer, analyst, etc.
- High school graduates should work for 2 – 4 years and then go to college.
- Is calculus really necessary for CS? This requirement bars entry into the CS field for math-challenged students. Having a business perspective is a much more appropriate requirement.

Funding

How can the CSIS program get funding for projects that connect our students with industry partners? SMC Foundation Board members stated that they are in the business of funding student success and are always looking for good projects. They can offer a financial incentive for participation in effective alliances. One suggestion was offering an award of \$1K to develop an open source product from a list of 500 possible apps. The CTE after-school program is successful at joining students, funding, and industry mentors. The Career Pathways program at SMC and other community colleges is also doing this.

Is our program in line with industry needs?

In the closing round of remarks, advisory board members stated that we are on track, asking the right questions, doing the right thing, career focused, doing realistic development of students, and have a pragmatic approach to entry onboard the industry.

Summary of Advisory Board Recommendations

1. **Create something:** Students applying for a job must show that they have produced something starting with their own idea and implementing it end-to-end. This should be in a public repository such as GitHub.
2. **See the big picture:** Solving business problems requires a whole problem perspective.
3. **Passion:** Inspire students to have passion and confidence.
4. **Big Data:** Teach how to deal with huge datasets using NoSQL.
5. **JavaScript web apps:** Teach development of "JavaScript everywhere" web apps with JSON (not XML).
6. **Mobile:** Teach how to write native apps for the iOS and Android platforms as well as mobile web apps.
7. **Embedded technologies:** Prepare students for the emerging field of smart devices, wireless, and smart homes.

8. **Look to the future:** Offer an emerging technology course because technology moves fast.

Attendees

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