

How *New* Makerspace Course Hit 50% Female Enrollment in 7 Weeks

And the Student Maker Club Went from 4 Males to 65 Students and Elected a Female Club President!

SUMMARY

City College of San Francisco’s (CCSF’s) MakerSPHERE Team committed to having an equal representation of female and male students in their Maker activities in their CCC Maker grant (www.cccmaker.com), but their Coordinator knew it wouldn’t be easy to deliver on this promise. She had toured successful Makerspaces in California and nationally and seen that the majority of students showing up were white male. Her observations fit with national studies that show only 20% of Makers are women.

CCSF brought in the National Institute for Women in Trades, Technology & Science (IWITTS) to hold a customized *Makerspace* version of the WomenTech Educators Training for its Maker Team and facilitate the development of a Recruitment and Retention Plan. **CCSF achieved 50% female enrollment out of the gate in only 7 weeks and again the next semester. Female completion for the first class was 92%. The Maker Student Club also went from 4 to 65 students: all male to 40% female with a female elected Club President.**



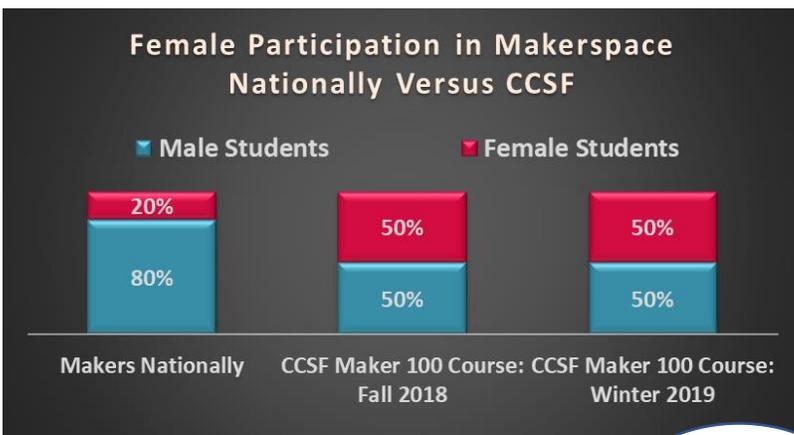
CITY COLLEGE OF SAN FRANCISCO (CCSF)
 San Francisco, California (Urban Area)
 Career Pathway: Makerspace

RECRUITMENT RESULTS

- 50% female enrollment in a new Maker 100 Course—12 men and 12 women—for 2 consecutive semesters
- CCSF’s Student Maker Club increased from 4 to 65 students: all male to 40% female with a female elected Club President

RETENTION RESULTS FIRST SEMESTER

- 92% female completion—11 of 12 women
- 83% male completion—10 of 12 men



KEY ACTIVITIES:

- “In-reach” via email to 750 female students already enrolled at CCSF increased female participation in MakerSPHERE
- In-person Women in Makerspace Info Sessions converted female prospects—6 of 7 women that attended enrolled in Maker 100
- It took multiple touches—including emails, an online interest survey, and Women in Makerspace events—to achieve 50% female enrollment



“The WomenTech Makerspace Training brought our team together and was expertly facilitated.

It led us through the process of capturing our busy faculty’s ideas, and collected them in a very effective way. Now we have an action plan for a short timeframe, so we can be ready for students the next semester.

I don’t think we could have gotten to this point without Donna’s facilitation. I knew from my past experience with IWITTS that Donna could help us create a plan that would produce results. The materials, the research-based strategies, the PowerPoint slides, and the sample Student Leads Sheets were all so valuable and engaged faculty in the process. **The WomenTech Makerspace Training enabled CCSF to achieve our grant’s goals to make our MakerSPHERE inclusive to ALL students from day one.”**

~ Maura Devlin-Clancy, MakerSPHERE Coordinator, Faculty, CNIT Department - Web Development Programs, City College of San Francisco, CA

CCSF'S MAKERSPHERE PROJECT ELEMENTS

According to Maura Devlin-Clancy, MakerSPHERE Coordinator, “Makerspaces go by many different names, some people call them ‘Fab Labs’ because they have fabrication equipment such as CNC routers, laser cutters, 3D printers, hand tools and a variety of tools and technologies for tinkering and building prototypes.”

CCSF's MakerSPHERE Project had several components:

- ☑ Makerspace activities embedded into a wide variety of STEAM classes including Architecture, Art, Business, Computer Networking and Informational Technology (CNIT), Computer Science, Engineering, Fashion, and Music.
- ☑ Makerspace activities available through labs at CCSF's Main Library and Science and Technology Buildings.
- ☑ *New* Makerspace 100 course developed as a stand-alone 3-credit certificate course.
- ☑ Makerspace paid internships offered to students, initially on-campus and later off-campus with industry partners.
- ☑ Maker Sphere badges, introductory workshops, mini-courses and open houses held on campus.

CCSF's MakerSPHERE 100 Practices of Making Topics:

- | | |
|-----------------------------------|---|
| ✓ Design Thinking | ✓ Rapid Visualization |
| ✓ Technical Design Drawing | ✓ Prototyping |
| ✓ Internet of Things | ✓ Virtual and Augmented Reality |
| ✓ Creative Coding with JavaScript | ✓ Programming Micro-processors, like Raspberry Pi |
| ✓ Construction | ✓ Fabrication |
| ✓ 3D Printing | |

CHALLENGES

Maura was concerned CCSF's *new* Makerspace program would end up like the others she had toured—almost all men—despite the diversity of the CCSF campus where 56% of the students are female and 70% are Under-represented Minorities (URMs):

“We knew from the beginning that Makerspaces had fewer female students because we did a lot of background work. We toured spaces, paid attention to the culture of Making, and looked at *Make Magazine*. I went into this project with my eyes open and knew this would be a challenge. 100% white males approached me about the Makerspace project that was emerging on campus.



The flyer features a colorful illustration of three people working in a makerspace. One person is using a 3D printer, another is using a soldering iron, and a third is using a power drill. The background shows a city skyline with buildings and a bridge. The text on the flyer includes:

CITY COLLEGE OF SAN FRANCISCO

maker SPHERE
CITY COLLEGE OF SAN FRANCISCO

MAKR 100 | Practices of Making
BRAND NEW CLASSES!
Wednesdays 3-6pm CRN 78493, Room Sci 233
Internships with local SF companies paying \$15/hour

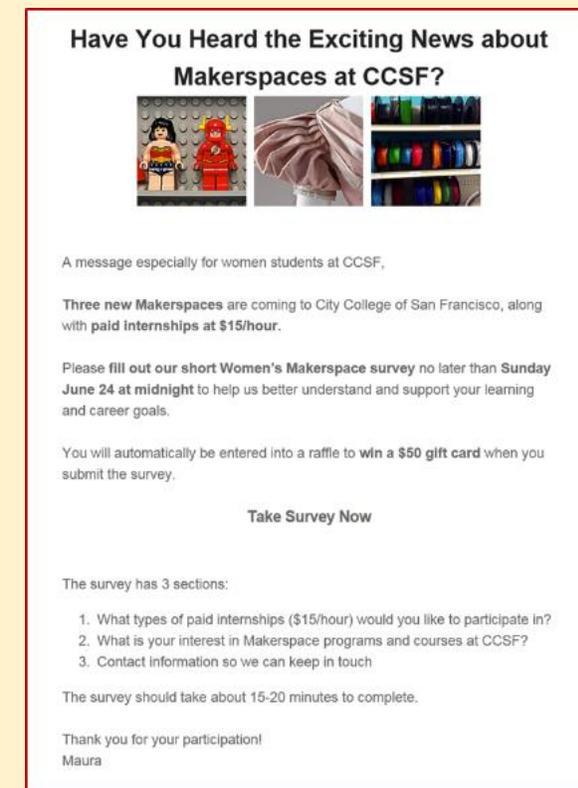
Maker Studies with courses in 2D and 3D design, coding and technology, and fabrication/construction such as sculpture and soldering.

Hands-on learning to bring your ideas and inspirations to life with skills like drawing, coding and building with paper, metals and virtual materials in our new makerspace classroom.

Open to all students, regardless of experience and level with these technologies.

- All students are welcome and can benefit with these in-demand skills.
- Free City Tuition applies.
- No materials cost to students.
- Course meets CCSF GE Area E requirement.

Figure 1. Flyer for CCSF MakerSPHERE Maker 100 Course



The email content includes:

Have You Heard the Exciting News about Makerspaces at CCSF?

A message especially for women students at CCSF.

Three new Makerspaces are coming to City College of San Francisco, along with paid internships at \$15/hour.

Please fill out our short Women's Makerspace survey no later than **Sunday June 24 at midnight** to help us better understand and support your learning and career goals.

You will automatically be entered into a raffle to win a \$50 gift card when you submit the survey.

Take Survey Now

The survey has 3 sections:

1. What types of paid internships (\$15/hour) would you like to participate in?
2. What is your interest in Makerspace programs and courses at CCSF?
3. Contact information so we can keep in touch

The survey should take about 15-20 minutes to complete.

Thank you for your participation!
Maura

Figure 2. Email 1 of 4 in Recruitment Campaign

I welcomed them and knowing that the early participants in a program often create the culture I realized that if I let things happen without any intervention that City College would end up with a space that would look like a lot of other Makerspaces.

When we announced MakerSPHERE at CCSF, we wanted to ensure it was a space welcoming and inclusive to all students. **I could see CCSF needed a plan to create an inclusive MakerSPHERE or it would not happen.** My background is in Computer Networking and I was part of CCSF's NSF-funded WomenTech Project with the Institute for Women in Trades, Technology & Science (IWITTS) that successfully increased female students in CNIT. **I knew we needed an outside facilitator** like Donna Milgram to help us create that plan."

HOW CCSF ACHIEVED 50% FEMALE PARTICIPATION AND 90% RETENTION IN MAKERSPACE 100

- ✓ **WomenTech Educators Training Customized to Makerspace**
- ✓ **Makerspace Administrators and Instructors Participated in Training**
- ✓ **Developed detailed Women and Makerspace Recruitment & Retention Plans**
- ✓ **Diverse Faculty Teaching CCSF Maker 100**

As part of the customized WomenTech Makerspace Training, IWITTS pulled together the existing research and examples on women and Makerspace into a 17-page annotated bibliography. According to Maura, **"Our team greatly benefited from having a menu of concrete strategies and the opportunity to get together to talk through our approach with a facilitator to lead the discussion."**

Lively discussions ultimately resulted in a detailed 14-page Recruitment Plan and 9-page Retention plan facilitated and written up by Donna Milgram, IWITTS Executive Director. **The Recruitment and Retention Plan templates reflected Maker-specific elements such as Physical Space (Recruitment) and Creating a Safe Space (Retention).** The plan also reflected the diversity of the Maker faculty—which includes female instructors in construction and welding as well as faculty of color and LGBTQ faculty. Maura intentionally recruited diverse faculty that would represent the students the team wanted to participate in Makerspace.

The Recruitment Training was delivered in May over 2 half days (8 hours) to a team of 8 key stakeholders involved in the MakerSPHERE program at CCSF, ranging from Makerspace instructors to the Dean of the Library. The Retention Training was delivered in September to 12 key stakeholders as more instructors were now in place (2 half-days, 8 hours). Donna also provided coaching for the plan's implementation to MakerSPHERE Coordinator Maura Devlin-Clancy: activities ranged from developing the recruitment email campaign and the online survey to feedback on the Online Women and Makerspace More Info session.



Figure 3. WomenTech Makerspace Recruitment Training

INSTITUTIONAL SUPPORT: WOMEN IN MAKERSPACE LEADERSHIP TEAM

Participating in teams ensures that key stakeholders are represented and invested and that the plan reflects their collective wisdom and networks.

- ✓ **Key Leader = Maura Devlin-Clancy, MakerSPHERE Coordinator**
- ✓ Dean, Fine, Applied and Communication Arts
- ✓ Dean of Library & Learning Resource
- ✓ Librarian (2)
- ✓ Instructor, Art
- ✓ Instructor, Metal Arts
- ✓ Instructor, Graphic Communications
- ✓ Instructor, Construction, Engineering, and Fashion
- ✓ Instructor, Computer Science
- ✓ Instructor, Music
- ✓ Employment and Training Specialist
- ✓ Entrepreneurship Coordinator
- ✓ Makerspace Student (Retention)



"It's very challenging work to change a culture and do these kinds of projects, and anytime I feel lost at sea I fall back on the plan."

~ Maura Devlin-Clancy, MakerSPHERE Coordinator, Faculty, CNIT Department - Web Development Programs, City College of San Francisco, CA

RECRUITMENT STRATEGIES

The MakerSPHERE Coordinator only had small windows of time in which recruitment activities could take place before the start of the semester because the campus was closed for the summer. Since faculty were also not working over the summer, she had to largely implement the plan on her own (with the support of her coach). Here's how Maura filled a *new* STEM course with half female students in such a short period of time.

- Graphic Design consultant creates **female-friendly Poster and Graphics** to replace utilitarian predecessor (see Figure 1)
- 4 recruitment emails** with female-friendly graphics and content about:
 - 1) *New* Makerspace 100 certificate
 - 2) Women and Makerspace Online Interest Survey
 - 3) Women and Makerspace More Info Sessions
 - 4) Paid internships
- Women and Makerspace **Online Interest Survey** gauged interest in:
 - 1) Makerspace 100
 - 2) Makerspace Internships and what type was wanted
 - 3) Women and Makerspace More Info Sessions

Note: A \$50 gift card served as an incentive to complete the survey by the raffle deadline.
- Eventbrite pages** were created for 3 Women and Makerspace Events:
 - 1) Spring in-person event held in the Makerspace
 - 2) Summer in-person at a nearby coffee shop (campus was closed)
 - 3) Spring online event

Note: Eventbrite enabled MakerSPHERE Coordinator to gauge anticipated attendance at events.
- Collecting emails of 750 CCSF female students in target audience:**
 - 1) Female students in STEAM classes with Makerspace elements
 - 2) Female students in related STEAM feeder courses identified by faculty on the Team
 - 3) Female students who had done Makerspace on-campus internships
- Women and Makerspace More Info Sessions (1 hour):**
 - 1) June on-campus event at library: 2 female students attended (campus was mostly closed for summer)
 - 2) August off-campus at nearby coffee shop: 5 female students attended (campus was closed for summer)
 - 3) June online event: 1 female student (technical issues likely resulted in low turnout, 10 expressed interest)

Outcome: 6 of the 7 female students who attended the in-person Women and Makerspace More Info Sessions enrolled in Maker 100—a conversion rate of 86%. Sessions included an overview of the Project, course, certificate and internships followed by a demonstration on coding paper circuits for LED lights with microcontroller chips to demystify it. Maura chose paper because it's an accessible material familiar to all students.



Figure 4. First CCSF MakerSPHERE Maker 100 Course Students and Instructors

Student Maker Club Went from all Male to 40% Female: MakerSPHERE used email to promote the Student Makers Club after it saw its success promoting Maker 100. The Dean of the Library announced the club in emails to a large contact list of CCSF students, while prior students found out by word of mouth. This was the key strategy that helped the club grow from 4 male students to 65 total students—40% of which are female—and elect a female club President (see Figure 5).

DIVERSITY AND MAKERSPACE

The MakerSPHERE Coordinator partnered with the African American Studies department at CCSF to develop a Makerspace workshop that would appeal to this community. The outcome was the **Freedom School**, which was attended by 40 African American students, counselors, faculty and staff. The Department Chair led in developing the subject matter of the event and Makerspace provided the space, materials and instruction for the workshop. Activities included making keychains on the laser cutters and buttons with the button maker. The African American Studies department used its own networks to recruit students to the event via active Instagram and Facebook groups, as well as promoting it to the students currently taking courses in their department. The event was a success and plans are in the works to have a Second Freedom School and an event with the Black Student Union.



Figure 5. New MakerSPHERE Student Club President Jhoany Chong



Figure 6. Freedom School Event Put on with African American Studies Department

ABOUT IWITTS: CREATOR OF WOMENTECH EDUCATORS TRAINING SYSTEM

The Institute for Women in Trades, Technology & Science has been helping educators nationwide close the gender gap for women and girls in technology since 1994. IWITTS provides tools, resources, and professional development for educators to help them broaden female participation in STEM and CTE programs where they are underrepresented.

To discuss what type of professional development would be the best fit for your school, region, or state please [Contact Us](#). Visit our website at: www.iwitts.org



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