

CoderDojo



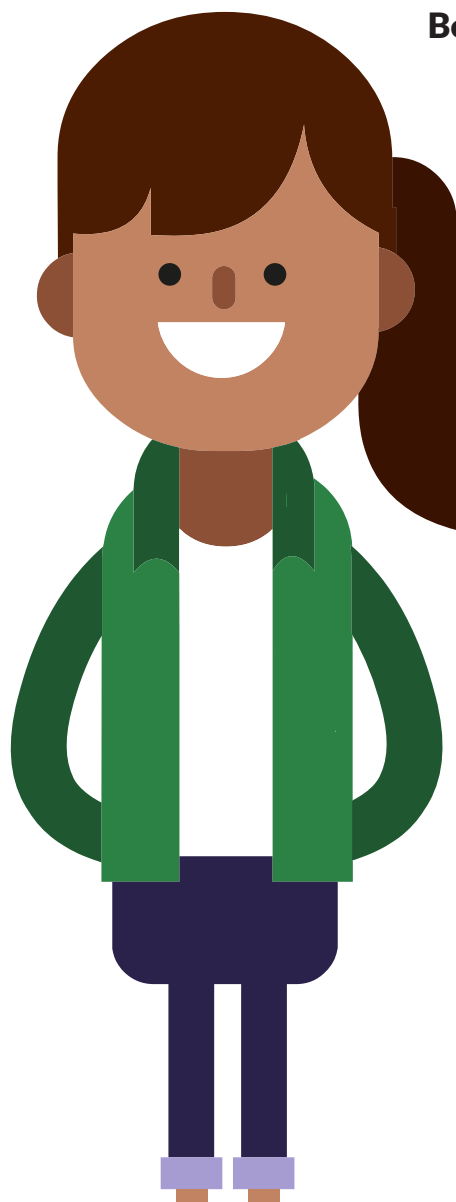
Empowering the future

A guide of best practices for increasing
the percentage of girls in your Dojo

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Foreword

Technology is everywhere; it is shaping every industry, from agriculture to healthcare. Technology and the code which powers it have become ingrained in our everyday lives. Yet many young people do not have the opportunity to truly understand technology, let alone learn how to create with and influence it. This is why CoderDojo exists, and it's what motivates tens of thousands of volunteers around the world to create learning opportunities for young people.



In just over six years, CoderDojo has given more than 150,000 young people in 75+ countries the chance to learn about technology. But like many others, we are facing a challenge reaching girls. Women are the fastest-growing demographic of internet and technology users, and girls are active users of technology¹. Yet among the people choosing to study computer science and related subjects at university level, women are in the minority. In the US, Women earn 57% of all undergraduate degrees², but only 18% of computer and information science degrees. Across 35 European countries, less than one in five computer science graduates is a woman³.

Why is that? Much research has been conducted to find answers to this question, and reasons regularly cited include a lack of role models, structural challenges, the role of peers, and societal perceptions.

Researchers have established two interesting facts about diversity: gender-diverse companies are 15% more likely to perform better⁴, and diversity is crucial for innovation⁵. So far, most of the technology we interact with has been designed by men. This has already limited the potential of women to develop or contribute to inventions. If we allow conditions to remain unchanged, we will continue to hinder innovations by women.

At CoderDojo we believe it is of paramount importance to society that we band together and make a conscious, consistent, and collaborative effort to increase the number of girls choosing to learn how to create with technology.

There are many great organisations working in this space at a national and local level, from the US-based organisation Girls Who Code to the Irish initiative

¹ <http://dojo.soy/CDG-WomenInTech> [accessed September 2nd 2017]

² <http://dojo.soy/CDG-NCWIT-infographic> [accessed September 2nd 2017]

³ <http://dojo.soy/CDG-OECD-FutureFemale> [accessed September 2nd 2017]

⁴ <http://dojo.soy/CDG-Mckinsey-Diversity> [accessed September 2nd 2017]

⁵ Global Diversity and Inclusion - Fostering innovation through a diverse workforce, Forbes Insights, 2011 <http://dojo.soy/CDG-Forbes-Innovation-PDF> [accessed September 2nd 2017]

Teen-Turn. To contribute our part, we launched a centrally focused CoderDojo Girls Initiative. Its purpose is to facilitate the sharing of best practices amongst Dojos.

To date we have focused on three main areas: encouraging and showcasing role models; content creation (including this very guide); and research (first Ninjas survey in May-June 2017). The ultimate aim of our initiative is to increase the global percentage of girls attending Dojos from 29% (annual survey 2016) to at least 40%.

Many Dojos and volunteers are already taking proactive measures to reach more young girls, from CoderDojo DCU, who pioneered an all-girls Dojo, to Johnny of CoderDojo London, who is working with Thomson Reuters, and to Rebecca at CoderDojo New York, who from a young age has understood the importance of role models. We want to showcase their tried and tested best practices to inspire more Dojos to join the movement to reach gender parity!

This guide is intended to act as practical tool for the CoderDojo community. It suggests clear, tested, and actionable measures which have been successful in engaging more girls into Dojos around the world. Our aim is to motivate all Dojos to make a conscious effort to increase the number of girls at their events. We believe that together we can move the needle, and change the dialogue from one of concern to one of celebration. We believe all girls deserve to have the space and support which will give them the same opportunities boys have in our increasingly technological world. We don't know what the world is going look like in ten years' time, but we do know it will be powered by code!

The CoderDojo Foundation would like to thank all the community contributors who shared their time, experience, and research to help put this guide together. Our particular thanks go to Johnny Claffey of CoderDojo London, Dr. Claire Quigley of CoderDojo Scotland, Gemma Cagney of Silicon Docks Dojo, Gisela Rossi of CoderDojo Ham, Wendy Cullinane of Clonakilty Dojo, Sandy Bernaerts of CoderDojo Mechelen, Niamh Scullion of CoderDojo DCU, Vanessa Greene of CoderDojo Girls @ DCU, and Pete Gegen of CoderDojo Rochester (Illinois). A special thank you to all the global CoderDojo community members who are already taking measures to reach and support more young girls. Your local efforts and achievements not only helped inspire this guide, it motivates more Dojos to join the movement and to reach gender parity. The CoderDojo Foundation would also like to thank Microsoft, our funding partner on this project, for their commitment to bring to life STEM skills for European youth. Our sustained partnership aims to enable more youth to become creators of technology with a focus on empowering more young girls to code.

Giustina Mizzoni
Executive Director CoderDojo Foundation

Increasing the percentage of girls in your Dojo



“Coding is a global skill, and a powerful tool for self-expression. Being a volunteer in initiatives such as CoderDojo gives people around the world the opportunity to become a part of a community and a culture which are filled with desire for sharing, warmth, and responsiveness — characteristics towards which every community should strive. I believe everyone, whether young or old, man or woman, should get to know this culture and gain a tool with which to discover and create, pursue goals and dreams, and make a difference!”

— Martina, CoderDojo Bulgaria

What is a best practice?

This guide seeks to identify and highlight best practices which have worked to increase the percentage of attending girls in Dojos around the world. To define a CoderDojo best practice, we used the criteria and methodology developed in a previous project, Erasmus+ CoderDojo Training in ICT Programming Skills.

CoderDojo best practices are actions, methodologies, or tools which already have been implemented in at least one Dojo, and demonstrably have the ability to introduce transformations with positive results in a Dojo's activities. They also need to be transferable to other contexts.

In this guide, there are two categories of best practices, namely those which can be implemented:

- Within a Dojo setting
- As a supplement to regular Dojo sessions

Best practices to enact in your Dojo

1. Dojo environment and layout

There are a variety of layout and seating approaches Dojos can use or trial to help create the most welcoming and engaging environment for girls. Each Dojo is unique, and there is a variety of factors which might influence the approach you take.

Your layout and seating should help to ensure that:

1. Your Dojo is, and is also viewed as, friendly to girls, so that girls who hear about it or attend it feel it is as welcoming to them as it is to boys
2. First-time female attendees are as likely as their male counterparts to return to subsequent sessions and become regulars

A proportion of any group of people who try an activity for the first time will decide it is not actually something they want to do again. It is useful to compare numbers according to gender to see if people of a particular group are more likely to drop out, so that, if this is the case, ameliorating actions can be taken.

CoderDojo Scotland's 2017 report covering Dojo attendance from July 2012 to December 2016 notes that the percentage of first-time attendees who didn't return for a second Dojo session was 19 points higher for girls compared to boys (64% vs 45%). Furthermore, only 23% of girls returned to more than one mixed Dojo (39% for boys). The Dojo's team notes in the report that "there may be factors in the Dojos themselves which discourage girls from becoming regular attendees".

Potentially discouraging layout approaches include:

- Putting highly experienced Ninjas beside complete beginners, exacerbating the ‘macho effect’ (see **Experienced-based layout** - page 6)
- Separating girls in male-majority spaces
- Distancing female Mentors from female Ninjas
- Dividing girls from friends
- Allowing unconscious bias in layout (seating girls far from engaging areas)

While there are many ways of creating a welcoming environment, we suggest four key approaches which can be used independently or in conjunction to help attract and retain more girls:

- Keeping peers/friends together
- Experience-based layout
- Age-based layout
- Girls table/space

Niamh of CoderDojo DCU says, “out of everything we’ve tried over the last four years, what has been most successful is creating a community feel: we had a girls space, and it really worked”⁶. Nowadays, CoderDojo DCU doesn’t have a dedicated girls space anymore, because the proportion of attending girls has increased so much that the Dojo is now mixed. Niamh explains that having the space helped to create the perception that girls are welcome at their Dojo, and this continues to attract girls⁷.

Keeping peers together

Avoid separating Ninjas who are friends, especially first-time attendees who come with a friend. Girls in particular can be strongly influenced by their peers. Having a peer attend with them increases regular uptake. Many Dojos, including Silicon Docks, have found that “girls who come to [the] Dojo with a friend are a lot more likely to return”. Therefore it is a good practice to encourage girls to bring their friends along to the Dojo, letting them know they will be allowed to sit and work together if they wish.

Experience-based layout

Many Dojos encourage girls to continue attending by creating a beginner space for Ninjas where they “feel safe to express themselves, to ask questions, and to speak their minds” (Gemma Cagney, Mentor at Silicon Docks Dojo). Some Dojos do this by setting up a table for beginners, or for those who are new to the Dojo. This space allows beginners to:

- Develop relationships with others who are new to the content being covered
- Ask questions without being afraid that others around them might know the answer
- Make mistakes without worrying that others might see them in a negative light

A beginner’s table can help quash what Harvey Mudd College (HMC) calls the ‘macho effect’⁸. This term describes circumstances in which a few vocal students, who are more experienced with technology, dominate a group session and thus undermine the confidence of other students, who as a result are more likely to drop out. In the experience of HMC, these vocal students tend to be male: due to how toys are gendered, boys tend to be given more opportunities to play with robotics (manipulative toys and vehicles) and computers (through computer games) from a younger age^{9 10}.

Note: If there are particularly experienced and vocal Ninjas in your Dojo, who appear to be intimidating to others, getting them to become less dominant can often be accomplished by simply explaining that they might be making others feel less confident, and that they can discuss their experiences with a Mentor instead.



“I’ve always found girls to be more engaged when they can sit with other girls, especially when they are new.”

— Gemma Cagney, Silicon Docks Dojo

⁶ <https://www.youtube.com/watch?v=uAWfH1Y-ypl>

⁷ <https://www.youtube.com/watch?v=uAWfH1Y-ypl>

⁸ Klawe, M., 2013. Increasing female participation in computing: The Harvey Mudd College story. *Computer*, 46(3), pp.56-58.

Age-based layout

In an approach similar to the experience-based layout, some Dojos split classes into age groups to deal with space and time constraints, as well as with older attendees becoming disengaged in an environment full of younger Ninjas. If a Dojo decides on this approach, the organisers usually create a space for 7- to 12-year-olds, and another space for 13- to 17-year-olds; you will be able to assess the best split for your group.

Gemma Cagney notes, “For us it hasn’t been necessary to separate Ninjas by gender; rather, what has worked is division by age. Our Senior and Junior Dojos give older and more experienced children a place to focus, and younger children can be their energetic selves.”

Microsofts Girls in STEM research has shown that young women in Europe develop an interest in STEM subjects at around 11 and a half years old, giving Dojos four to five years to nurture that interest before young women self-select out of STEM studies at 15¹¹.

If you are contemplating splitting your Dojo by age, it is important to make sure that doing so also supports the continuation of female attendance. Studies have noted that there is a tendency for girls in particular to drop out around the ages of 12-13 as they transition to secondary/high school¹². At this age, many young people begin to judge activities in terms of whether they support their future and their career aspirations. Accenture’s latest report notes that girls’ career plans appear to be strongly influenced by what kind of work they enjoy and also see as creative and beneficial to society¹². Emphasising the plethora of computing-related careers¹³, and how they fit these criteria, is a good way to encourage girls at this critical age to keep attending your Dojo.

We advise against implementing an age-based layout in your Dojo if only 20% (or less) of attendees are girls, especially if doing so would divide their numbers. In these extreme cases, we recommend setting up a girls table or space.

⁹ Cherney, I.D. and London, K., 2006. Gender-linked differences in the toys, television shows, computer games, and outdoor activities of 5-to 13-year-old children. *Sex Roles*, 54(9-10), p.717.

¹⁰ Barron, B., Martin, C.K., Takeuchi, L. and Fithian, R., 2009. Parents as learning partners in the development of technological fluency.

¹¹ Microsoft - Girls in STEM http://dojo.soy/Microsoft_Girls (2017)

¹² Accenture - Attracting more young women into Science and Technology 3.0 (2017)

¹³ <http://dojo.soy/CDG-FindingAda-Posters> [accessed September 2nd 2017]

Girls table/space

Many girls can feel overwhelmed and out of place in a predominantly male environment. The aim of a Dojo is to make all children feel welcome, and to create an inclusive space. When there is such a skew, a dedicated table can be a very effective way of creating a welcoming space for girls within the larger Dojo. Girls tables can be particularly effective if you have a very low number ($\leq 20\%$) of female Ninjas as well as female technical Mentors. Pete Gegen of Rochester, Illinois Dojo says, “We start girls-only teams, tables, or groups when the percentage of female participants drops very low (under 20%). We have seen this approach give very good results¹⁴.” CoderDojo DCU, Clonakilty Dojo, and CoderDojo Ham (among other Dojos) have set up a table or space dedicated to girls at their events.

Four years ago, CoderDojo DCU had less than 5% female Ninjas. With the help of their girls space, they could greatly increase female attendance, and girls have moved from the girls area into the mixed area, where many sessions now have a 50:50 gender split.



“We started a girls-only class in the same room as the mixed beginners class. We were overwhelmed with support, with 20 girls attending once there were specific tickets for them. Parents mentioned that they’d had bad experiences bringing their daughters to coding clubs where they were completely outnumbered. There were delighted they could finally bring them somewhere the girls were comfortable.”

— Sarah Doran, Mentor, CoderDojo DCU

In terms of the table itself, Johnny of CoderDojo London has observed that circular tables are better for promoting teamwork and collaboration, because Ninjas can move around them more freely than around rectangular tables. For Dojos with over 20% girls, just creating a girls space at one end of a long table can be enough to have a positive effect on female attendance.

¹⁴ <http://dojo.soy/CDG-Forums> [accessed September 2nd 2017]

At Clonakilty Dojo in Cork (where the ratio of boys to girls is 9:1), Mentor Wendy heads a circular girls table to encourage girls to work together and build relationships. Wendy explains her reasons for creating the girls table, and how she went about it:

“I was concerned that my daughters were becoming bored and finding it difficult to socialise at the Dojo. This meant they didn’t want to attend anymore, which broke my heart.

I also saw that girls at our Dojo were feeling overwhelmed by the sheer numbers and the chaos of the boys. I thought we should carve out a space for girls to hang. Margaret, the Dojo Champion, was very supportive.

I was allergic to the idea of ‘pink-ifying’ the space, and I also didn’t want to seem too militant about keeping it ‘girls only’. I wanted a table off to the side – not in the middle of the jungle, but not too far away from the rest of the crowd either.

We make sure we have the same table each week, and I’ve assigned myself as the primary mentor for the group. Other mentors come over to answer questions, but I try to stay close. The other mentors are supportive, and the parents of girls are definitely supportive – parents of both a boy and a girl were a bit conflicted in the beginning, but we’re getting around that by letting siblings sit at the table too.”



“In CoderDojo@DCU, one thing which surprised visiting Mentors was that the girls were not segregated from the boys, instead we were all in one big room. The girls just sat together, so it was a bit less intimidating for them. Another key success factor was that we ran a girls-only session, and more amazing female Mentors came to help out. The presence of female role models is really important – indeed it can’t be overestimated. All of these measures enforce the fact that there is space in the tech world for women.”

— Niamh Scullion, Mentor, CoderDojo DCU



“We’ve found that pairing up girls at one end of the table is even more effective than splitting Ninjas up by gender.”

— Gemma Cagney, Mentor, Silicon Docks Dojo

Targeted invites and select ticket holding

Encouraging girls who attend to return is vital, particularly in Dojos where they are in a minority. Targeting invites to girls who have previously attended and ring-fencing tickets for girls are both effective approaches to this.

Some Dojos hold tickets specifically for girls who attended their last Dojo for a week or two before releasing them to the general public. Other Dojos hold a proportion for girls (anywhere from 20-50%) to encourage an increased uptake by girls. This method is particularly effective in Dojos which are consistently oversubscribed or sold out.

Case study by the Glasgow Science Centre Dojo team

The team (Claire Quigley, Craig Steele, and Martin Goodfellow) recognised that the numbers of girls attending their Dojo had been low for two to three months, and that no girls had signed up for the upcoming Dojo event. To try to rectify this they sent personalized invitation emails to five girls (and their parents/guardians) who had attended before. Most signed up and came along.

After doing this for two or three events with good results, the team started holding back around 5 tickets (out of 25) and offering them initially to girls who had previously attended. If any of these tickets weren't taken, they were added to the ticket pool available for general booking. This was a particularly effective intervention for the team, and was a major factor in getting the percentage of girls at the Science Centre Dojo from 18% to 26%.

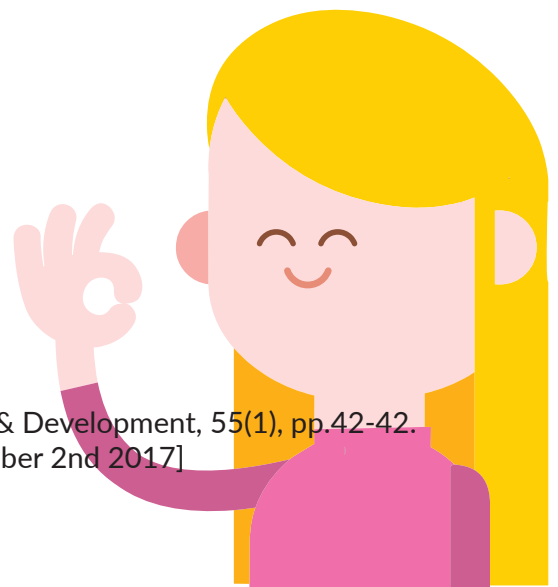
The Glasgow Science Centre Dojo team would normally send the email invitation to the Ninja and her parent/guardian, which would include either a booking link or a link to the ticket itself. To see examples of email templates for this purpose, and to find out how you can send emails using the community platform, check out the appendix at the end of this guide.

Mentoring approaches

It is important that your Dojo's mentoring approaches support how girls learn and ask for help. Gisela from CoderDojo Ham said that girls in her Dojo had a "different process of asking for help", and she observed that they seldom spoke up when they were in need of assistance. In pedagogy it is noted that often the loudest children, or 'squeaky wheels', receive the most help and attention, whereas those who are shy and don't speak up when they find something difficult are often assumed to be fine¹⁵. Thus, less outspoken children can end up being overlooked, even if they are unable to progress. Providing a space for less confident girls can enable them to get the support they need, thereby preventing them from dropping out. Moreover, if they receive assistance and can advance their skills, this will likely help them to build their confidence and thus to speak up in future. See section 4 for specific advice on female Mentors.

Teaching Bravery

Reshma Saujani, the founder of Girls Who Code, notes that girls are being socialized to be perfect¹⁶. In her coding program for girls, mentors see this embodied in girls being afraid of not getting things right straight away and often finding fault with themselves. Sometimes girls even prefer to pretend they didn't try and don't show their coding attempts to mentors. It is important to explain to girls that trial and error are necessary and useful parts of coding and debugging, and to encourage them to persevere and develop their resilience.



¹⁵ Weiss, R.P., 2001. Gender-biased learning. *Training & Development*, 55(1), pp.42-42.

¹⁶ <http://dojo.soy/CDG-Ted-Bravery> [accessed September 2nd 2017]

Fostering a support network

Developing a support network among the girls in your Dojo is another way to help build their resilience. Wendy of Clonakilty explains uses her girls table to try and promote camaraderie among the girls by encouraging them to celebrate each other's accomplishments. She explains: "Before the National Scratch competition, I had all the girls show their entries just to the girls table. I wanted them to relish the sense of achievement — but I also wanted to show the girls how to support one another, so they could learn how to compete whilst also being happy for each other."¹⁷



2. Language and images

Language

The language we use every day is important, because it determines and reinforces our perceptions of people and things. The same can be said for the language Dojo organisers use to describe their sessions in their communications.

Research has shown that girls respond better when certain elements of programming are highlighted over others^{18 19}. Harvey Mudd College quadrupled their number of female computer science majors by taking a three-step approach: rebranding, showcasing role models, and providing practical hands-on opportunities. The rebranding involved changing the name of their 'Introduction to programming in Java' course to 'Creative approaches to problem-solving in science and engineering using Python'. This resulted in the number of women taking the course rising from 10% to 40%. UC Berkeley had a similar experience when they renamed their 'Introduction to symbolic programming' course 'Beauty and the joy of computing'. While the name was not just changed to attract female students, women outnumbered men among the course attendees for the first time in 20 years. This demonstrates that semantics matter.

CoderDojo Scotland conducted research into the event pages of their Dojos: they categorised and analysed pages from events of 2012-2016, and cross-referenced the results with the gender balance of the events. This revealed that descriptions which were specific and emphasized creativity were more likely to attract girls. Conversely, descriptions which emphasized competition or showcasing of work, or which used jargon were much less likely to attract girls.

Writing Dojo descriptions aimed at girls

When creating events for your Dojo, you should actively emphasize creativity, specificity, and familiarity.

- Describe activities in a way that highlights the opportunity for being creative, emphasising that attendees can make something new and of specific interest to them. Examples include activities which incorporate music (Sonic Pi) or art and design (Scratch).
- Ensure that you are describing activities in terms of clearly defined goals, e.g. 'we will make X', or 'we will do Y'. Avoid general descriptions like 'you can explore coding' or 'you will be able to work on your own projects'.
- Does the description connect the activity to non-computing terms and concepts with which people are likely to be familiar and comfortable? For example, 'writing stories', 'sharing with friends', or 'jelly babies'.
- When writing your event description, it is useful to mention that attendees can bring a friend. Girls are often influenced by peers¹⁹, so having a friend come to the Dojo can make the environment seem more welcoming.

Language to avoid

There are some terms you should avoid using heavily, as event descriptions which include these have been shown to attract low numbers of girls.

- **Jargon:** does the language in the description contain words or phrases only known to people who are already familiar with a topic? These might refer to computing (e.g. 'CSS', 'HTML', 'scripting', 'prototype'), or to another element of the activity (e.g. 'dubstep' - music; 'Dutch angle' - film; 'protagonist' - literature).
- **Competition:** is the event described in a way which makes it sound like a contest (e.g. with terms like 'the best', 'winning')? Does the description imply that the session involves being compared to others, as opposed to comparing and discussing ideas or approaches to a problem?
- **Showcasing:** does the description indicate that attendees will have to demonstrate what they know to other people, or even present their work to a group (e.g. phrases like 'Show us what you can do', 'Come and share your computing knowledge')?

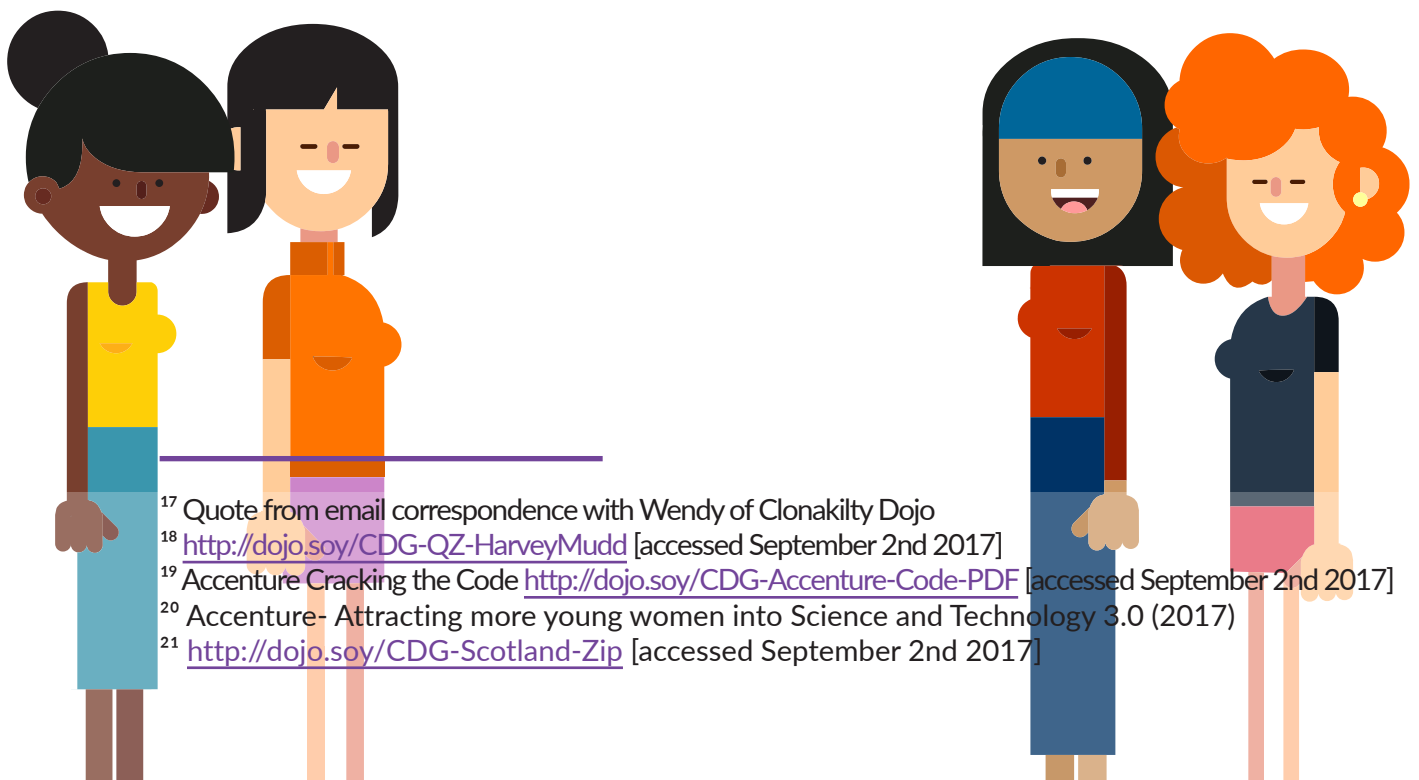
Images

When promoting your Dojo on social media, in local papers, by email or using leaflets, it's useful to include a photo or photos of what the event might look like. Like wording, the images you use to illustrate your Dojo are important. While more engaging than text, photos, videos, and other images strongly impact the external perception of your Dojo. It is vital that your images highlight how open, fun, and inclusive your Dojo is.

Tips for collecting diverse images

- If you have a photographer coming to the Dojo, be sure that they take images which represent the range of genders, ethnicities, and ages of your Ninjas.
- If you have a very low number of girls attending your Dojo, utilising your girls table or holding a girls event can be useful for collecting images of female Ninjas.

If you don't currently have any photos of your Dojo, there is a selection from other Dojos which CoderDojo Scotland has made available (see footnote)²¹. Please note that permission to use these only applies for the purpose of publicising Dojos.



¹⁷ Quote from email correspondence with Wendy of Clonakilty Dojo

¹⁸ <http://dojo.soy/CDG-QZ-HarveyMudd> [accessed September 2nd 2017]

¹⁹ Accenture Cracking the Code <http://dojo.soy/CDG-Accenture-Code-PDF> [accessed September 2nd 2017]

²⁰ Accenture- Attracting more young women into Science and Technology 3.0 (2017)

²¹ <http://dojo.soy/CDG-Scotland-Zip> [accessed September 2nd 2017]

How can I be certain images are as appealing to girls as to boys?

- Make sure both boys and girls are present in the images you share.
- Share several images, so assumptions aren't based on one snapshot.
- Use images of children/teens having fun, laughing.
- Publish photos highlighting a variety of projects, including creative and visual activities.

Note: Why not highlight girls or female Mentors in your Dojo as role models? If you want them to feature on our blog and social media channels, please get in touch at info@coderdojo.org. A blog post will require a few images and a short bio of the person. Optionally, they can also provide answers to a set of questions on their role and what they are doing in the Dojo. You could even share an article like this in your local paper to raise awareness of the Dojo among girls in your area.



3. Dojo content

Activities

The content used in a Dojo can influence the level of interest and participation of girls. As mentioned above, coding and computers are often seen as ‘for boys’. Therefore, it is important to make sure that the activities at your Dojo do not reinforce this perception, and are engaging for both boys and girls. There are a number of considerations to keep in mind when you are planning the content for your Dojo.

Gemma Cagney offers the following advice based on her experiences:

- Find out your female Mentors’ skills and interests, and encourage them to use these when devising session content.
- Spread responsibility for content across a team of people, so they can support and help one another; no one person should be irreplaceable, or crucial to the success of a session — that’s too much pressure!
- Have a catch-up before each session with the entire team responsible for it. The catch-up is the time to go through concerns, raise issues, and share techniques which are working.

Practical and hands-on

Uncertainty about the subjects’ relevance is one of the top factors influencing girls’ interest in STEM subjects, according to a research project conducted by Microsoft in Europe²². CoderDojo New York founder Rebecca stresses the importance of learning code as a skill which can be applied to many other areas, and says that it’s just one part of a bigger picture²³. Girls are more likely to be interested in learning to code when they can visualise what they can do with it and how they can apply it in the real world²⁴.

²² <http://dojo.soy/CDG-Microsoft-Factors> [accessed September 2nd 2017]

²³ <http://dojo.soy/CDG-Rockstarseo-Garcia> [accessed September 2nd 2017]

²⁴ <http://dojo.soy/CDG-Microsoft-STEM-age> [accessed September 2nd 2017]

- A hands-on experience is more likely to interest girls²⁵. This does not necessarily mean physically hands-on, as in a hardware project, but rather refers to how the learning is presented. Take a 'Learning by doing' approach: encourage kids to jump right in and experiment with the code, letting them 'break' it and figure out mistakes together with the Mentors.
- Claire of CoderDojo Scotland advises Dojos to give newcomers a functioning basic program which they can 'remix'. That way they're never faced with a blank page, which could be daunting and potentially frustrating. Changing a program into something that's their own is a positive, confidence-building experience.

Easy to follow with visible results

A structured activity which has a clear purpose or goal is more likely to engage girls than one which focusses on coding for the sake of coding²⁶. Try to make programming more accessible by presenting learning in a way that makes it 'look easy'.

- Start small with short activities which inspire confidence, so that kids appreciate that coding is something they are able to do. Avoid overwhelming them by giving them large projects at the beginning.
- Aim to use resources which guide the learner through making a specific project from start to finish, instead of resources which teach programming techniques concept by concept. Not only will this help learners visualise what they are setting out to achieve before they start, but by creating a project they will have something to show for their efforts at the end.

Creative

- It is important to give girls the opportunity to be creative²⁵. Use resources which combine coding with creative topics such as music, storytelling, art, and film²⁸. Give them projects which they can adapt and put their own spin on.
- Encourage girls to see technology as something not only to be consumed, but as another medium for creating²⁹. Enable them to express themselves through code and be who they are, whether that involves creating a website about make-up or designing a Scratch game with space aliens.

- For hardware projects, don't focus purely on the technology, but turn it into a more creative activity, for example by combining it with art, crafts, or fashion. Introduce things like robotics and wearables as new ways to get creative with familiar toys such as LEGO or dolls.
- Emphasise the creative nature of coding itself: often there is no one 'right' way to do something, but many possible solutions to the same problem, so try choosing activities which demonstrate this. Perfect examples are resources from a number of Dojos which involve using different ways to make the same game in Scratch³⁰.

Gender-neutral

In the presence of a majority of boys, it can be easy to (unconsciously) lean towards projects themed around stereotypical 'activities for boys', such as sports or fighting games. At the opposite end of the scale, when planning activities with girls in mind, it might be tempting to overcompensate by incorporating typically 'girly' subjects, or by 'pink-ifying' resources. However, doing so perpetuates stereotypes and risks making girls feel pigeonholed³¹.

Instead of using different content for boys and girls, aim to use resources that are gender-neutral for all Ninjas. This places everyone on an equal footing. Karen O'Connell, speaking at DojoCon 2013³², said: "Boys and girls can equally work with any of the technologies available at the Dojo. There may be differences in how they choose to implement what they learn, but we do not intend to teach certain technologies to boys and others to girls".

²⁵ <http://dojo.soy/CDG-Microsoft-STEM-age> [accessed September 2nd 2017]

²⁶ <http://coderdojoscotland.com/toolkit/gender-balance/> [accessed September 2nd 2017]

²⁷ www.education.minecraft.net [accessed September 2nd 2017]

²⁸ <http://coderdojoscotland.com/toolkit/gender-balance/> [accessed September 2nd 2017]

²⁹ <http://dojo.soy/CDG-Rockstarseo-Garcia> [accessed September 2nd 2017]

³⁰ For example, http://kata.coderdojo.com/wiki/Pacman_Game [accessed September 2nd 2017]

³¹ <http://dojo.soy/CDG-sfgate-NotPink> [accessed September 2nd 2017]

³² <https://coderdojo.com/news/2013/04/18/coderdojo-girls-dojcon2013/> [accessed September 2nd 2017]



“If the kids need inspiration for choosing the ‘subject of the month’ about which to make a project, we purposefully try to pick something very neutral which doesn’t specifically target boys or girls — usually a general subject like holidays, colours, etc.”

— Tom Puttemans, Zumst Dojo, Belgium³³

Female uptake in STEM subjects has been found to be higher where the curriculum is perceived to be gender-neutral³⁴. By using Dojo content which is not biased towards one gender or another, you show that learning about technology is for everybody, and you also avoid stereotyping either boys or girls. As a result your Dojo will be a more inclusive space.

Technologies

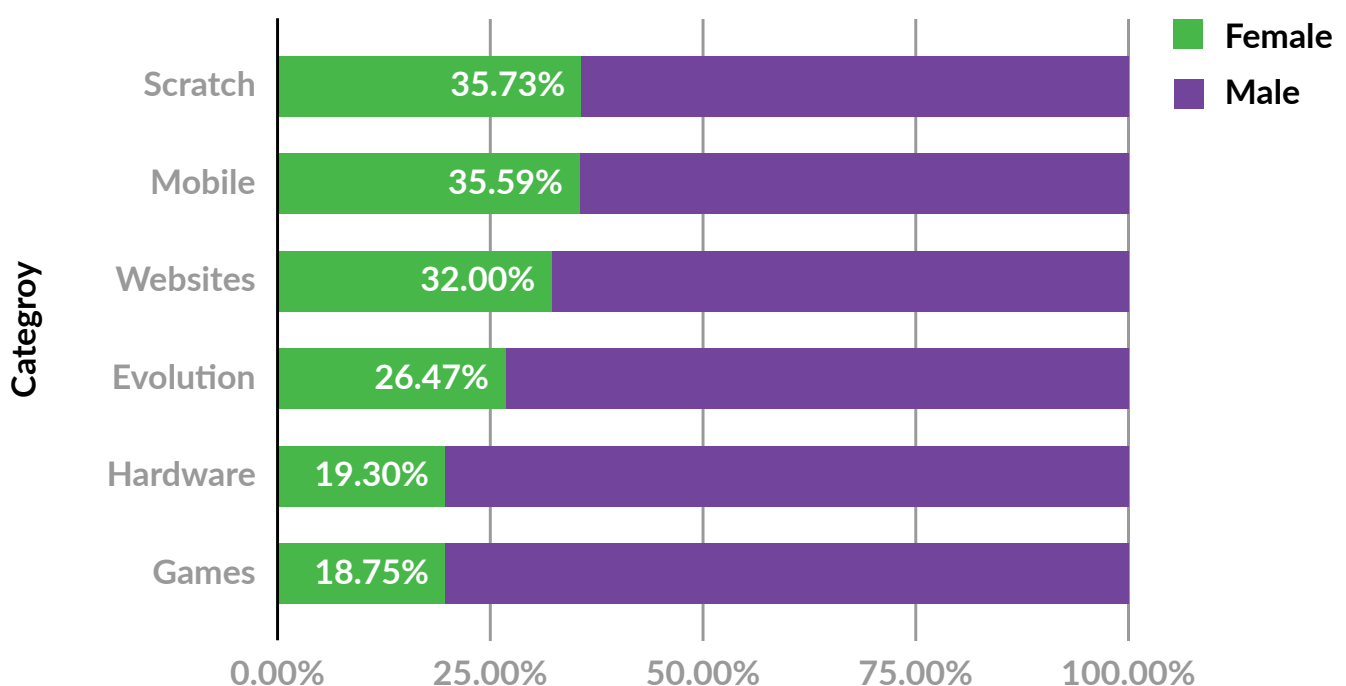
Bear in mind that how a technology is presented can have a bigger impact on its appeal than the technology itself. Below are just a few suggestions of technologies which are suited for projects implementing the advice in the Activities section, and which Mentors have found to be popular among female Ninjas.

- **Scratch:** Perfect for beginners with its friendly drag-and-drop, block-based interface which enables quick creation of animations and games, while also being suitable for more experienced coders. Scratch offers lots of possibilities for artistic creativity and storytelling.
- **Mobile:** App Inventor is another block-based program which provides tangible results in the form of apps for Android devices. Making mobile apps is both practical and creative, and moreover very much applicable to life in our modern world.
- **Web design:** Learning languages such as HTML, CSS, and JavaScript gives kids the opportunity to be creative and make something tangible and familiar (i.e. web pages).
- **Minecraft Code Builder:** This new immersive coding programme promotes computational thinking and creative coding which appeals to a wider youth audience and in particular girls²⁷.

- **Hardware:** Projects with Raspberry Pi, Arduino, and BBC micro:bit are great practical activities which give instant visible results. Interestingly, the hardware category in the Coolest Projects showcase has been one with a lower proportion of female entrants. However, it is important to consider the different ways in which a topic can be framed, and which of these is likely to maximise interest. The Silicon Docks Dojo has had success in getting girls excited about robotics by incorporating art and crafts into hardware projects. Moreover, wearables are an excellent way to combine code, hardware, and artistic creativity: CoderDojo BE found that robotics appeared to be more appealing to the boys, and so Mentors decided to introduce wearables as a way to make it appeal to girls as well.
- **Processing:** A flexible open-source software sketchbook and a language for learning how to code within the context of the visual arts. Art-based projects have proven hugely popular with girls across numerous Dojos.
- **Sonic Pi:** An open-source programming environment designed to explore and teach programming concepts through the process of creating music and sounds.
- **Twine:** An open-source tool for telling interactive, nonlinear stories. You don't need to write any code to create stories with Twine, but if you like, you can extend them with variables, conditional logic, images, CSS, and JavaScript.

An analysis of the Ninjas' projects at Coolest Projects 2017 offers some additional insight into the technologies which are popular with girls at Dojos:

Coolest Projects 2017 participant gender breakdown by category



Subject matters

The subject matter you use in an activity will very much depend on the children themselves. Find out where their interests lie and choose topics which are familiar to them. Take local interests into account; for example, farming might be a topic which children are interested in if they live on a farm, or have friends who do. Based on the research mentioned, on observations made at Dojos with a high proportion of girls, and on the topics of projects entered by girls into the Coolest Projects showcase, we have collected the following subject suggestions.

- Social issues and helping people
- Nature and the environment — this could be addressing real-world issues such as environmental protection, or it could be something as simple as creating games which have animal characters
- Art, music, and dance
- Narrative-style projects incorporating storytelling and adventure



³³ <http://dojo.soy/CDG-Forums> [accessed September 2nd 2017]

³⁴ <http://dojo.soy/CDG-Microsoft-STEM-age> [accessed September 2nd 2017]

³⁵ Pavlo on the CoderDojo Open Community Call [49:30–49:50] <http://dojo.soy/CDG-CommunityCall> [accessed September 2nd 2017]

Suggested resources

The CoderDojo resources platform³⁶ contains lots of useful free content for Dojo activities. Sushi Cards are a good example: these are collections of double-sided A4 concept cards designed to be practical, easily digestible, and gender-neutral. They are available for beginner- to advanced-level learners, and cover a variety of topics. The CoderDojo Foundation continuously adds to and updates the collections based on your feedback. Additionally, there are many supplementary resources and projects available on the platform which have been created and shared by members of the CoderDojo community, who use them at their own Dojos.

Our *CoderDojo Nano: Create with Code* book series is a colourful and fun introduction to code:

- *Build Your Own Website* guides you through making a website with HTML and CSS from start to finish
- *Make Your Own Game* shows you how to make your very own PC game with JavaScript by teaching the principles of game making, from animation to creating a complete game world



Sushi Cards

Here are some good places to start on the CoderDojo resources platform. Visit our homepage to find more paths.

- Scratch path³⁷
- App Inventor path (mobile app development)³⁸
- Websites (Javascript)³⁹
- Python path⁴⁰
- Wearables⁴¹

Examples of additional resources created by members of the CoderDojo community and other organisations working in this space include:

- Write interactive stories with the Twine app⁴²
- Make music by writing code with Sonic Pi⁴³
- BBC micro:bit meteors game created by two girls at CoderDojo York⁴⁴
- Flappy Bird game in Scratch⁴⁵
- Storytelling with the Python programming language⁴⁶
- Draw snowflakes with Python⁴⁷
- Cat meme generator⁴⁸

³⁶ http://kata.coderdojo.com/wiki/Home_Page

³⁷ http://dojo.soy/CDG-Scratch_Path

³⁸ http://dojo.soy/CDG-App_Inventor

³⁹ <http://dojo.soy/CDG-JavaScript>

⁴⁰ http://dojo.soy/CDG-Python_Path

⁴¹ <http://dojo.soy/CDG-Wearables>

⁴² <http://dojo.soy/CDG-Twine>

⁴³ http://dojo.soy/CDG-Sonic_Pi

⁴⁴ http://dojo.soy/CDG-Meteors_Game

⁴⁵ http://dojo.soy/CDG-Flappy_Bird

⁴⁶ <http://dojo.soy/CDG-Storytime>

⁴⁷ http://dojo.soy/CDG-Turtle_Snow

⁴⁸ http://dojo.soy/CDG-Cat_Meme

4. Female role models

Female role models are crucially important for ensuring that young women develop and sustain an interest in computing, coding, and digital making. A 2016 study conducted by Accenture and Girls Who Code highlighted this: it found that girls have a significantly higher interest in computing/coding when they have female teachers for these subjects, while the level of boys' interest is not affected by the gender of the teacher. Significantly, the study also showed that, of the girls who had female role models in the areas of computing and coding, 62% said they were likely to study these subjects in college. Conversely, only 15% of girls with no role model said the same. Role models are critical when less than half (40%) of young women said they're able to get any practical experience with STEM activities at school ⁴⁹.

“[Female representation] is one reason I’ve made a big effort to always be present in our Salesforce Dojo. Even if we struggle to keep many girls in our classes, that I demonstrate interest in tech and lead classes helps ensure that the boys I teach don’t develop biased assumptions, such as women not being part of tech.”

— Claire Whitehead, Salesforce Dublin Dojo

Mentors act as the main role models in a Dojo setting. Across the globe we see a correlation between the number of female Mentors and the number of girls in CoderDojo. In 2016 the percentage of girls among the total number of CoderDojo attendees was 29%, and the percentage of female Mentors was also 29%. Each year since we began collecting data on diversity in Dojos in 2014, we have observed very similar numbers of female Ninjas and Mentors.

Year	Percentage of female attendees	Percentage of female Mentors
2014	28%	29%
2015	30%	27%
2016	29%	29%

Female Mentors in relation to girls tables

If your Dojo has a low proportion of female attendees as well as few female technical Mentors, one way to make sure these Mentors are being best utilised as role models for girls is to ask them to lead a girls table (see **Girls table/space** - page 8). Male Mentors can also assist at a girls table, but ideally a female Mentor should lead, in order to counter gender stereotypes.

“When we started our own CoderDojo in our village, getting female Mentors to lead sessions was the best example and motivation to young female coders.”

— Dave O'Shaughnessy, Dunlavin Coderdojo

“Encouraging and supporting female Mentors to lead some activities is a key point. We often find the boys in the Dojo defer to the opinions of male Mentors, even when there are female Mentors present who are more knowledgeable in the relevant area. Having female Mentors lead sessions helps counteract this.”

— Claire Quigley, CoderDojo Scotland

“The best thing a Dojo can do is to have a woman on the leadership team in a very visible way.”

— Jennifer Wadle, Kansas CoderDojo

Youth Mentors

Near-peer Mentors have proven very effective at engaging young people and beginners in STEM areas⁵⁰. Near-peer Mentors are more relatable to Ninjas than adult Mentors, because they are closer in age and share more similar life experiences and interests with them. Female youth Mentors can have a particularly strong influence on young girls, who might otherwise feel out of place in a male-dominated Dojo setting. Many Dojos, for example CoderDojo Zero (Cork) and CoderDojo DCU, use youth Mentors as role models and support for female Ninjas.

Having a female youth Mentor helps retain younger girls; being a youth Mentor motivates older girls to continue attending their Dojo, and aids them in building confidence⁵⁰. Youth Mentor Ina, who started attending the first-ever Dojo more than five years ago, notes: “My time as a Mentor is very rewarding, particularly when I see children as young as four or five watching the words ‘Hello world’ appear on the screen.” She also says that “the huge amount of confidence mentoring in Dojos has given [her]” is one of her favorite things about CoderDojo.

Youth Mentors should be involved in decision making along with older Mentors, and should be encouraged to suggest topics on which they would like to lead sessions. Always support girls when they express interest in being a youth Mentor, but never pressure them into taking up the role.

Increase the number of female Mentors in your Dojo

The first option is to attempt to increase the number of female Mentors at your Dojo. Every Dojo should be aiming at parity of the number of female to male Mentors, but the more female Mentors you can attract, the more likely the girls in your Dojo are to continue attending and to further their interest and even aspire to a career in technology.

Some ways to attract female Mentors are:

- Connecting with local women in local tech organisations and speaking to them about your Dojo.
- Recruiting parents: you might be able to convince mothers who bring their kids to the Dojo to become Mentors, even if they don’t have technical skills. A good way to encourage this is to hold a training session for parents with non-technical backgrounds using beginner-level content, e.g. Scratch or HTML/CSS.
- Approaching educators and schools to try and encourage female teachers to join your Dojo as Mentors.
- Encouraging female Ninjas in your Dojo to become youth Mentors. This will give younger girls a person to look up to, and it will help your Dojo become sustainable.

⁴⁹ Tenenbaum, L.S., Anderson, M.K., Jett, M. and Yourick, D.L., 2014. An innovative near-peer mentoring model for undergraduate and secondary students: STEM focus. *Innovative Higher Education*, 39(5), pp.375-385.

⁵⁰ Tenenbaum, L.S., Anderson, M.K., Jett, M. and Yourick, D.L., 2014. An innovative near-peer mentoring model for undergraduate and secondary students: STEM focus. *Innovative Higher Education*, 39(5), pp.375-385.

“When it comes to recruiting female Mentors, you have to repeatedly reassure them they're ‘qualified’ to mentor. Very often women at our ‘Women in tech’ events have told me they had thought about signing up as Mentors, but didn't feel they were qualified, and after being reassured, they immediately signed up.”

— Jennifer Wadle, Kansas CoderDojo

Invite female guest speakers to your Dojo

Even if you cannot get 50% female Mentors in your Dojo, you should endeavour to invite women working in the technology sector to come and speak to your Ninjas. They will be particularly inspirational for girls in your Dojo. Moreover, there are numerous historical examples of women who have shaped the field of computing, such as Ada Lovelace and Grace Hopper. Highlight the contributions of these people, since they can also serve as role models for female Ninjas.



“Role models were hugely important to me as a Ninja, and they still are today, even in university. Having other women teaching me to program impacted me strongly — I'd never seen female developers before I stepped into CoderDojo. My experience was that female Mentors sometimes were easier to talk to when I was stuck on something. As a very shy teenager, I certainly found having female Mentors less intimidating than having only male Mentors would have been.

I know that it's an almost overused statement, but I think the saying ‘You can't be what you can't see’ is true. If modern-day computing heroines were more visible to younger women, we could break down the current stereotype that coding isn't for girls. It would demystify programming. Some traditional educators still say ‘Women can't have a career in technology’. At the end of the day, we simply can't go on letting younger women feel out of place in technology.”

— Vanessa Greene, 21, CoderDojo DCU Mentor

Best practices in addition to your Dojo

5. One-off girls events

Holding a one-off girls event can raise awareness of your Dojo, alerting girls and women in your neighbourhood, community, or corporate environment to the fact that you are actively encouraging female participation in your Dojo. Such events may be particularly helpful for beginners who have misconceptions about coding being ‘for boys’⁵¹, and who as a result have never considered joining a Dojo.

Events focussed on girls can be as informal or as structured as you like. Typically they’ll include a combination of streams covering different content. Ensure that the activities you offer allow a young person to feel a sense of achievement within a short space of time, e.g. 20 minutes. Have Ninjas rotate through streams so they are exposed to a number of different methods of learning. Often one-off events include talks by women working in the technology sector about their journey.



⁵¹ <http://dojo.soy/CDG-Accenture-Growth> [accessed September 2nd 2017]

Case study by CoderDojo Scotland



While one-off girls events can be hugely popular, it's important to also highlight figures released by CoderDojo Scotland⁵² showing that girls whose first attendance is at a mixed Dojo instead are:

- almost seven times more likely to subsequently attend at least one
- other mixed Dojo session
- five times more likely to attend more than one mixed Dojo session

Dr. Claire Quigley, of the Glasgow Science Centre Dojo, provided this summary of the case study:

Our least successful intervention was holding three one-off events that were for girls only and had all-female mentor teams. Of the 74 participants, 92% did not return to attend any of the regular Dojos, despite being invited to do so at the event and being sent an email invitation to the next session of the mixed Dojo. This was a surprise, as the events themselves were very popular, with the one in Glasgow for example recording 55 sign-ups and 41 attendees.

Although the reasons for why so many girls didn't return are unclear, we established possible contributing factors:

- The descriptions of the next mixed Dojo sessions were heavy on jargon and competitive terms, and implied that attendees should possess prior knowledge of tech.
- The all-girls Dojo events were longer than normal Dojo sessions, in order to give the girls a chance to try out several activities, on the grounds that this would make them more likely to find one which really grabbed their attention. However, the length of the events may have put them off.
- Events like this might help to demystify coding, but don't necessarily give all girls the confidence to enter a mixed environment and work with boys who appear to be more knowledgeable.
- The fact that there is a special event for girls may reinforce the ideas that 'girls don't code' and have to be given special treatment.

Considering that so many girls signed up and attended, it appears that there is an interest which is not currently being met in a way that works for girls. So while we didn't find the events useful, it may be possible to reframe them to avoid negative outcomes while still retaining their positive aspects.

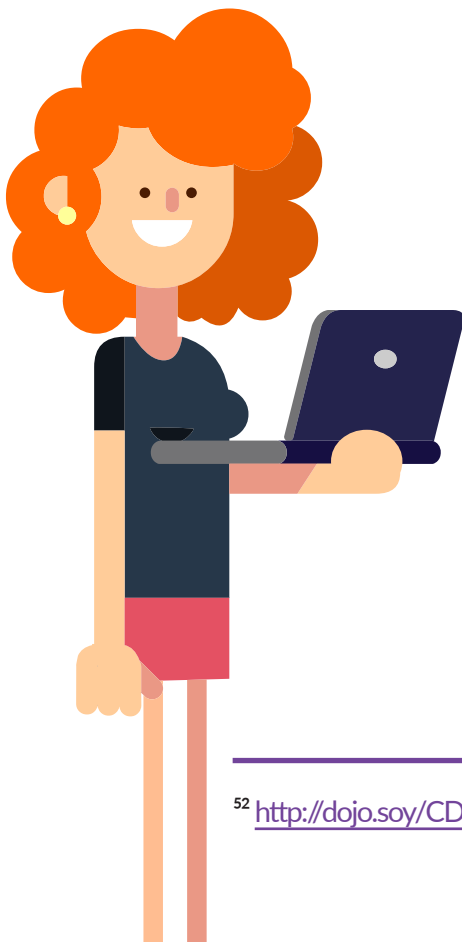
Measures to try to improve one-off event outcomes include:

- Encouraging girls to come with a friend or group of friends.
 - Including girls you already have in your Dojo as peer mentors.
 - Integrating part of the event with a regular Dojo session, so that attendees can get an idea of what the Dojo is usually like.
 - Making sure the event is very similar to a regular Dojo session, to give girls a realistic taste of the Dojo experience.
-

While the results of the research conducted by CoderDojo Scotland are worth noting, it is important to remember that they only collected data about Dojos in Scotland; different results might be found in other countries, for example where the educational system is more segregated. If you employ this best practice, we recommend that you rigorously monitor whether the number of girls attending your regular Dojos increases or decreases following the event.

“Make sure to emphasise the creativity and social aspects of programming and CoderDojo.”

— Sandy Bernaerts, CoderDojo Belgium



⁵² <http://dojo.soy/CDG-Scotland-Report-PDF> [accessed September 2nd 2017]

How do I run a one-off girls event?

- Treat the event like your regular Dojos.
- Choose the format/flow of your event.
- Give careful consideration to the content.
- Make an effort to have a large proportion of female Mentors, who could include regular female attendees at your Dojo.
- Promote the event using images featuring girls via social networks, community notice boards, local girls schools, etc.

After the event

- Encourage the girls to attend a Dojo regularly by directing all attendees to a Dojo afterwards: hand out flyers, or gather email addresses of the girls (and parents/guardians) to send them event notifications.
- At subsequent sessions, record how many girls who attended the one-off event return to your regular Dojo. Please share these numbers with the CoderDojo Foundation, so we can continue to develop our research into the effectiveness of one-off girls events.



6. Serial events focussed on girls

Many Dojos, like the Thomson Reuters Dojo in London, run series of girl-centric events to increase the number of girls at their Dojos. CoderDojo London and Thomson Reuters teamed up in 2015 to host their first-ever all-girls Dojo. Following the resounding success of the event, CoderDojo London now run monthly girl-centric Dojos.

In their research report, CoderDojo Scotland describe the success of a summer-camp-style event they ran in Inverness: 25 girls, who had never been at a Dojo, attended five coding sessions over the course of a week. 40% of them went on to attend more than one mixed Dojo session, compared to 23% of girls returning after first attending either a single mixed or girls-only Dojo session⁵³.

Tips for running sustainable serial girl-centric events⁵⁴

- Invite girls back to each event directly (if they are under 13, do this via a parent's email address).
- Your events should be fully inclusive and open to boys. It's a good idea to hold back a set amount of tickets for girls per event to encourage gender parity.
- Describe each event in a fun jargon-free way which appeals to girls of all ages.
- Use images of girls participating in your Dojo in social media communications.
- Encourage women to mentor and help out at the events.
- Incorporate table-based activities, giving consideration to the content used.
- CoderDojo digital badges: Issuing Ninjas with digital badges is an excellent way to reward and recognise their achievements as they move along their learning path.

⁵³ <http://dojo.soy/CDG-Scotland-Report-PDF> [accessed September 2nd 2017]

⁵⁴ <http://coderdojoscotland.com/toolkit/gender-balance/> [accessed September 2nd 2017]

7. 'Bring your parents to Dojo' day

"CoderDojo is free, but it's not a free ride."

— Bill Liao

Research in the 2017 Accenture report⁵⁵ tells us that girls are much more aware of the influence of their parents, teachers, and friends than boys are, and that this influence is more pronounced the younger the girls are.

- Almost two thirds of girls (65%) said their parents and family are the most likely group to influence subject choices at school.
- 49% of girls said their parents influence their career aspirations.

Parents not only heavily influence the career aspirations of their daughters, but are also the gatekeepers of their free time. CoderDojo is a free extra-curricular activity, therefore a parent's role in a child's participation in CoderDojo is significant. One way to engage parents in computer programming and STEM subjects is to host a 'Bring your parents to Dojo' event. Dojos often ask parents to stick around for the duration of the Dojo, especially parents of young people under 12. Thus many parents attend Dojo sessions anyway, making it even easier to host an event like this.

Recently, CoderDojo Scotland ran 'multi-generational' BBC micro:bit workshops. Although some parents initially felt trepidation, by the end of the session they were really involved. Their feedback on this chance to work on something with their child and understand technology better was very positive.



How can I motivate parents to attend?

Holding a 'Bring your parents to Dojo' event is an excellent opportunity to demystify programming for all parents of all computing competencies, and to entice them to participate more in their daughter's learning journey.

At such an event a parent can:

- Understand exactly what their daughter is learning at a Dojo
- Watch their daughter present new ideas and concepts to a group
- Encourage and inspire their daughter simply by being present in the Dojo environment
- Personally upskill
- Learn tools to better support their Ninja's development at CoderDojo
- Build confidence to volunteer at more Dojo events, thereby increasing the volunteer-to-Ninja ratio

Tips for running a 'Bring your parents to Dojo' event:

- Plan short and engaging talks and workshops, keep content simple
- Have Mentors and volunteers at the Dojo, explain their roles
- Display Ninja projects featuring various computer languages
- Highlight the benefits of the CoderDojo platform (badges, printable resources, e-learning modules, forums, etc)
- Share upcoming events which may be of interest to parents (EUDojo, DojoCon, Coolest Projects, etc)
- Keep things lighthearted and fun, end on a high note
- Encourage parents to sign up and book in via the CoderDojo platform
- send follow-up communications with more information and a feedback request

Katherine Manuel, SVP of Enterprise Innovation at Thomson Reuters, attended the 'Bring your parents to Dojo' event of the Thomson Reuters CoderDojo NYC with her daughter. This is what she said about it⁵⁶:

"During the Dojo event, I watched children who had never coded before build their own apps and express excitement and delight in what they accomplished. In three hours, my daughter created a graphic which danced to various rhythms and tunes, sharing it proudly with her peers and event Mentors. I was flabbergasted by just how fast this pace of learning was, [and I saw] how fundamental teaching and training our children is to their success in the world; doing so must be of utmost importance to all of us. I hope that [at 'Bring your parents to Dojo' events] parents reignite their own curiosity for what is possible."



⁵⁵ Accenture- Attracting more young women into Science and Technology 3.0 (2017)

⁵⁶ <http://dojo.soy/CDG-Forbes-Daughter> [accessed September 2nd 2017]

8. Showcasing real-world careers

Role models working in the technology industry can provide insight into the sector, which in turn can help increase engagement of young people and motivate them to aspire to a similar career. Try reaching out to local tech-based organisations to invite guests to speak at your Dojo or to lead a session. We asked CoderDojo community members and supporters for insights into the different roles available within the tech industry. Below we give some job-related reasons for why young people should learn how to code, as well as two examples of role models you could invite to your Dojo.

Careers: Currently there is a huge demand for developers and only a limited supply. This trend is expected to continue, as the global tech sector is projected to grow more than any other sector in the coming years. Having a career in this industry can be very lucrative. By learning digital skills early, you are more likely to enter into one of these careers in the future. Some possible careers for code learners are:

- Animator
- Engineer
- Games Designer
- Software Developer
- Web Developer
- IT Manager
- Architect
- Information Security Analyst
- Data Scientist
- Music Technician
- Agricultural Specialist
- Healthcare Professional
- Physicist
- Biologist

Flexibility and upskilling: Work when you want! A lot of tech companies value their employees highly, and therefore focus on finding ways to help them to work better. Some of the perks many companies in the industry offer are remote work (from home or another country), unlimited holidays, or the opportunity to tailor your schedule so that it works best for your current project or team. This can give you the flexibility to do freelance work, learn new skills, and gain more experience.

Crucial skills: Even if you don't want to write code in your work, it is still important that you learn to understand it. Code is the language of the future, and understanding it may soon be a basic required skill for any job.

Example role models

Serena Fritsch - Product Engineer at Intercom



Intercom is a messaging platform which helps businesses connect with consumers. Today more than 20,000 businesses use Intercom to connect with a billion people worldwide. Intercom has raised \$116M in venture funding, and has 350+ employees across its San Francisco headquarters, Dublin R&D office, and recently opened Chicago office. Serena is a Product Engineer in the Intercom Dublin office.

Who are you and what is your role?

My name is Serena and I am a Product Engineer at a company called Intercom. We build products which help businesses communicate with their customers in a personal way.

Where did you come from and how did you get this role?

I was always fascinated by technology and how it affects humans. I studied Computer Science at Stuttgart University, and then went on to obtain a PhD degree from the Distributed Systems Group in Trinity College Dublin. During my PhD studies, I was developing software on a variety of platforms and languages. I quickly learned that I loved building software and products that people use more than I loved academic work, and I also wanted to work in a team. When I finished university, I got hired as a Product Engineer for a startup and never looked back!

Code is...?

Coding is a fun way of being creative. In a world where everything is driven by technology, learning to code enables you not only to be a user of technology, but also to be its master and creator.

What's your advice for youth interested in getting coding and a career in tech?

Follow your passion, be curious to learn new things, and never be shy of asking questions — everything else will fall into place. The tech sector is a wonderful, varied place with endless possibilities for a developer.

Meadhbh Foster - Business Integrity (Data Operations) at Facebook



What do I do?

I work on the Data Operations team for Business Integrity in Facebook. We try to keep unsuitable paid content (like ads) off Facebook. I help to develop and track our metrics, analyse experiments, act as the data expert, and provide support to my colleagues on other teams. I mostly use languages like SQL and Python for querying and performing analyses.

How did I end up in this role?

I love solving problems, and for me that's what this role is all about — making sure that we have the data we need to be able to answer important questions, and the skills necessary to find solutions. Before I joined Facebook, I was a Business Analyst in a smaller company's customer experience department, and before that I completed a PhD in Cognitive Science at University College Dublin.

Any advice for young girls who are interested in the tech sector?

Figure out what you're interested in, and try to learn everything you can about it. Technical skills you develop are transferable between different roles, even if the specific subject areas are not the same. Don't be afraid to ask questions and speak to women and men working in the areas in which you are interested. Most people are happy to share their experiences of study and work, especially if it means encouraging more young people into tech careers.





Overview of best practices

Best practices to enact in your Dojo to increase the % of girls	% of girls currently attending		
	<20%	21-40%	>40%
Keeping peers/friends together			
Experience-based layout			
Age-based layout			
Girls table/space			
Personalised email invites for Dojo tickets			
Holding a proportion of tickets for girls			
Female-friendly Mentor approach			
Assessing language used to describe Dojo			
Assessing images used to describe Dojo			
Content catch-ups with all Mentors before a Dojo			
Considering content you use			
Increasing number and leadership input of female Mentors			
Inviting female guest speakers to your Dojo			
Avoiding assignment of stereotypical roles and activities			
Highlighting women in technology throughout history			
Female Mentors leading a girl's tables			
One-off girls events * (include strategies to encourage future attendance)			
Serial girls events (sequence of five or more sessions e.g. summer-camp-style event)			
Increasing parent engagement e.g. parent-inclusive event			
Providing information on careers related to computing			

Legend

Strongly advised action to take	
Advisable action to take	
Positive action to take	
Positive but not necessary	
Advised against in this situation	

* CoderDojo Scotland found girls-only events to be unproductive in getting girls to attend regular Dojos, although running them did highlight an obvious unmet interest among girls who attended the one-off events⁵⁷.

Dealing with negative reactions

Like in many areas of life, people associated with your Dojo may be resistant to change or reluctant to admit there is a problem. Some may not be aware that there is an issue with gender representation in the Dojo. Mentors who have studied programming at college, and/or work in the technology sector, may be less responsive, because they have become accustomed to gender disparity⁵⁸.

Recording numbers of Ninjas and noting any increase or decrease in attendance and churn rate of girls is useful for highlighting issues, determining which approach is most suitable for your Dojo, and explaining why a specific intervention is necessary.

If gender disparity is an issue at a Dojo, it is important that Champions, Mentors, volunteers, and parents can discuss it in an open non-confrontational way. Openly evaluating different approaches to the issue allows everyone to give input and state their opinion. This guide can be used to start the discussion.

CoderDojo Scotland experienced pushback when trialling strategies to improve gender balance in their Dojo. They point out that, although some of the suggested measures may be seen as ‘positive discrimination’, and therefore potentially as ‘unfair’ or ‘artificial’⁵⁴, their aim is to create a more diverse environment. Achieving this will make it easier for young people of all genders, backgrounds, and cultures to get involved in CoderDojo. Working towards this goal can mean employing strategies in the short term which are to some extent ‘artificial’⁵⁹, in order to reap long-term benefits.



“Hopefully we won’t need approaches to increase the proportion of girls in Dojos in the future, but for the time being it feels like a necessity.”

— Gisela Rossi, CoderDojo Ham

The purpose of the approaches we have collected here is not to segregate genders, or to simplify the content girls learn. Gisela from CoderDojo Ham notes that there are girls at her girls table who are learning complex programming concepts and Python at a first-year bachelor degree level. These tried and tested best practices aim to combat significant disparity, to create a welcoming space for girls, and to increase the proximity of female role models to Ninjas.

⁵⁷ <http://dojo.soy/CDG-Scotland-Report-PDF> [accessed September 2nd 2017]

⁵⁸ Discussion with Gisela, CoderDojo Mentor, on her experience after completing a degree and masters in Computer Science and working full-time as a Python developer

⁵⁹ <http://dojo.soy/CDG-Scotland-Report-PDF> [accessed September 2nd 2017]

Conclusion

This guide set out to provide clear, tangible, and practical best practices which volunteers and Champions can implement in their Dojo. As Dojo volunteers you are in the ideal position to see what works best for your Dojo. The experiences of the Mentors and Champions mentioned in this guide illustrate that, with **conscious**, **consistent**, and **collaborative** effort, we can increase the number of girls learning the potentially life-changing skills to create with technology.

More information

Many Dojos are already taking measures to reach more young girls, and we want to work with them to inspire even more Dojos to join the movement to reach gender parity! In early 2017, we launched the Girls Initiative. Its aim is to identify and implement proactive measures to increase the percentage of girls attending Dojos around the world from 29% to at least 40%.

How can I support the Girls Initiative?

- Utilise proactive approaches to increase the proportion of girls in your Dojo. Reading this guide is the first step. Now talk with your team and pick a best practice to trial in your Dojo.
- Nominate role models. More than likely there are girls in your Dojo who are working on amazing projects, or Mentors going above and beyond to make your Dojo as inclusive as possible. Celebrate your female Ninjas/Mentors by encouraging them to send us a piece about themselves which we can feature on our website and social media channels. Contact us via info@coderdojo.org
- Share your lessons and ideas. Join our forum group, where we will be facilitating community discussions on what is working to engage girls of all ages.
- Have an idea to increase participation of girls in CoderDojo you'd like to share? Get in touch directly with info@coderdojo.org

Appendix

How to email members of your Dojo from within the CoderDojo Platform

Champions and those with Dojo Admin permissions are able to email all the members of their Dojo/s, or apply filters to only email a specific group (e.g. mentors), on the CoderDojo Platform at zen.coderdojo.com. There are numerous benefits to this – you can, for example, keep female Ninjas and their parents more engaged by directly inviting them to your next Dojo event.

While logged into Zen, click on your name in the top right-hand corner, and select 'My Dojos' from the drop-down menu. Then click on 'Manage Users'. Here you can select 'Send Email' on the bottom right. On this page, you can draft and format an email which will be sent to all users (BCC'ed) who are joined to your Dojo.

If you want to email a specific user group, for example parents or Ninjas, select that group on the 'Manage Users' page to filter, and then click 'Send Email'.

Email templates

This email template example is for a Dojo covering a specific topic:

Hi <NAME OF CODER>

We've held a ticket for you in case you'd like to come to this month's CoderDojo session at <VENUE> on <DATE AND TIME>.

At this Dojo we'll <DESCRIPTION OF THIS SPECIFIC DOJO>.

Let me know if you'd like to come along, and I'll send you the link to get your ticket.

Best wishes,

<YOUR NAME>

The example below is for a Dojo not covering a specific topic:

Hi <NAME OF CODER>

We've held a ticket for you in case you'd like to come to this month's CoderDojo session at <VENUE> on <DATE AND TIME>.

At this Dojo you can work on a project you've already started, or find out how to get started with something in an area of your interest. No previous experience with coding is required. Some examples of things you could do with code are:

- Writing interactive fiction
- Building a website
- Making music
- Building an app
- Creating your own game

Let me know if you'd like to come along, and I'll send you the link to get your ticket.

Best wishes,

<YOUR NAME>.



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