

# The Carpentries: Programmatic Assessment Report

January 1, 2012 to October 31, 2018

Authors: Maneesha Sane, Erin Becker

## What is The Carpentries?

Software Carpentry (SWC), Data Carpentry (DC), and Library Carpentry (LC) are lesson programs of The Carpentries (a fiscally sponsored project of Community Initiatives). We teach essential computing and data skills. We exist because the skills needed to do computational, data-intensive research are not part of basic research training in most disciplines. Read more at <https://carpentries.org/> (<https://carpentries.org/>).

## About Software Carpentry ¶

Software Carpentry enables researchers to create purpose-built tools, whether it be a Unix shell script to automate repetitive tasks, or software code in programming languages such as Python or R. These enable researchers to build programs that can be read, re-used, and validated, greatly enhancing the sharing and reproducibility of their research. Read more at <https://software-carpentry.org/> (<https://software-carpentry.org/>).

## About Data Carpentry

Data Carpentry learners are taught to work with data more effectively. Workshops focus on the data lifecycle, covering data organization, cleaning and management through to data analysis and visualization. Lessons are domain-specific, with curricula for working with ecological data, genomic sequencing data, social sciences survey data, and geospatial data. Read more at <https://datacarpentry.org/> (<https://datacarpentry.org/>).

## About Library Carpentry

Library Carpentry develops lessons and teaches workshops for and with people working in library- and information-related roles. Our goal is to create an on-ramp to empower this community to use software and data in their own work as well as be advocates for and train others in efficient, effective and reproducible data and software practices. Library Carpentry data is not included in this report as it joined The Carpentries as a lesson program on November 1, 2018. Future Carpentries programmatic assessment reports will include Library Carpentry data. Read more at <https://librarycarpentry.org/> (<https://librarycarpentry.org/>).

## What The Carpentries offers

- A suite of open source, collaboratively-built, community-developed lessons
- Workshops based on a learn-by-doing, 'code with me' approach
- A supportive learning culture
- Instructor training, mentoring and support
- Active global community which subscribes to an inclusive code of conduct
- Evidence-based, proven pedagogical training methods
- Ongoing development opportunities
- Open discussions

The Carpentries began systematically recording data for our workshops in 2012. We use this data to investigate how The Carpentries has grown over the years including number and geographic reach of our workshops, and learners at these workshops. We also look at our Instructor Training program, including number and geographic reach of instructor training events, number of trainees and their completion rates, and onboarding of new Instructor Trainers.

Data are collected by a team of Workshop Administrators. In Africa, Australia, Canada, New Zealand, and the United Kingdom, Workshop Administrators are affiliated with our member institutions and provide in-kind staff time. A full-time Carpentries staff member is the Workshop Administrator for the rest the world.

## Part 1: Workshops

Carpentries workshops generally comprise two full days of face-to-face instruction, based on materials specific to their lesson programs.

Workshops are taught by volunteer trained and certified Instructors. Certified Instructors comprise people who have completed our instructor training course. Carpentries lessons are all open source, and are hosted on GitHub.

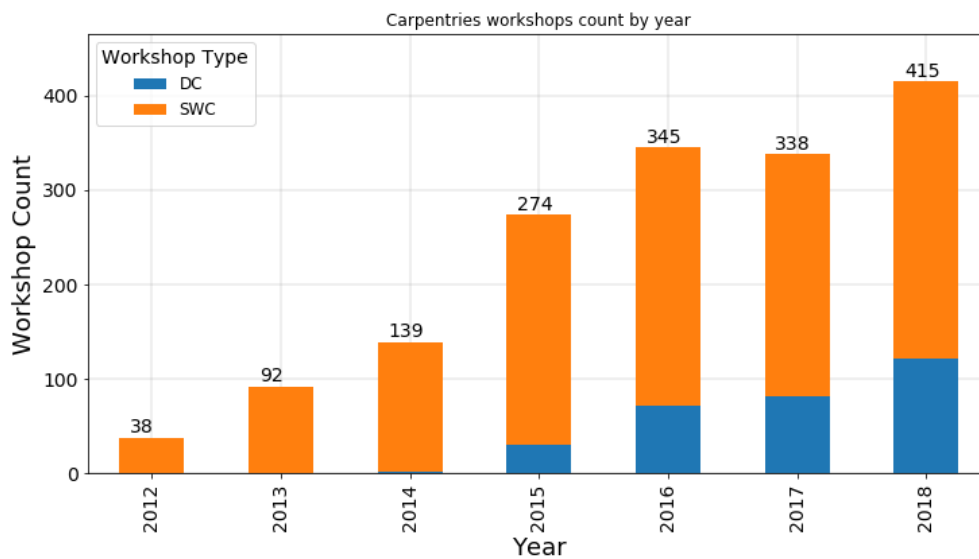
The full data set can be found in the Programmatic Assessment folder of The Carpentries Assessment repository on GitHub (<https://github.com/carpentries/assessment/> (<https://github.com/carpentries/assessment/>))

### Figure 1: Workshops by Carpentry lesson program by Year

This bar chart shows the number of Data Carpentry (DC) and Software Carpentry (SWC) workshops each year. Data for 2018 is a projection calculated by looking at the number of workshops run in the same time period in 2017.

In 2018 we expect to run 121 Data Carpentry and 294 Software Carpentry workshops.

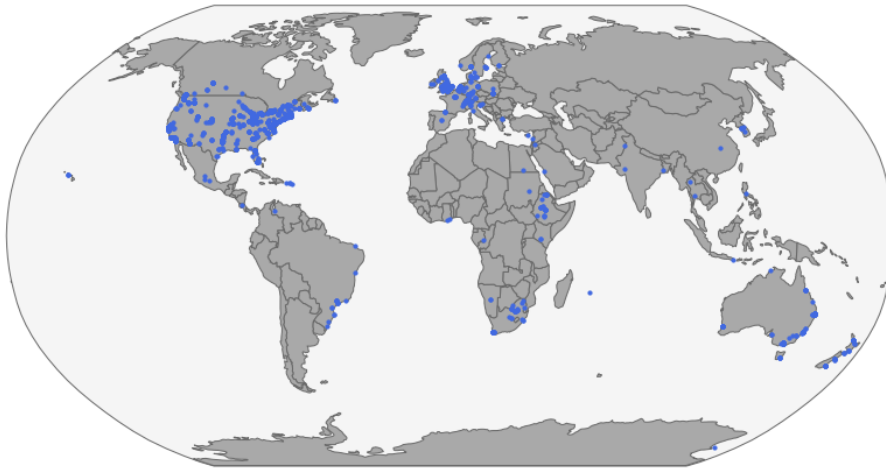
Source data can be found in Table 1 in the Appendix.



### Figure 2: Geographic Reach

Each dot on the map below represents one workshop since 2012. Source data can be found in Table 2 in the Appendix.

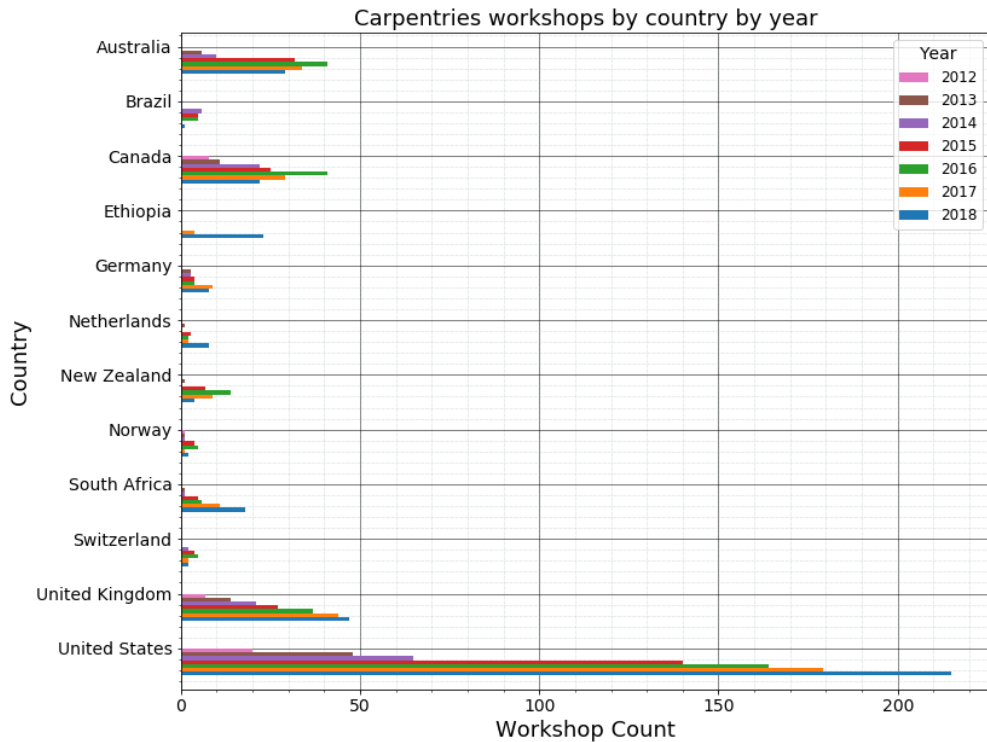
Carpentries workshops, 2012-2018



**Figure 3: Countries hosting 10 or more workshops**

This bar chart looks only at countries that have hosted 10 or more workshops since 2012. For each country, the number of workshops run each year is plotted. Data for 2018 is a projection. For most countries, this projection is based on the number of workshops run in the same time period in 2017. For workshops in countries with a shorter history with The Carpentries (Ethiopia and South Africa), this projection is based on the average number of workshops per month in 2018.

Source data can be found in Table 2 in the Appendix.

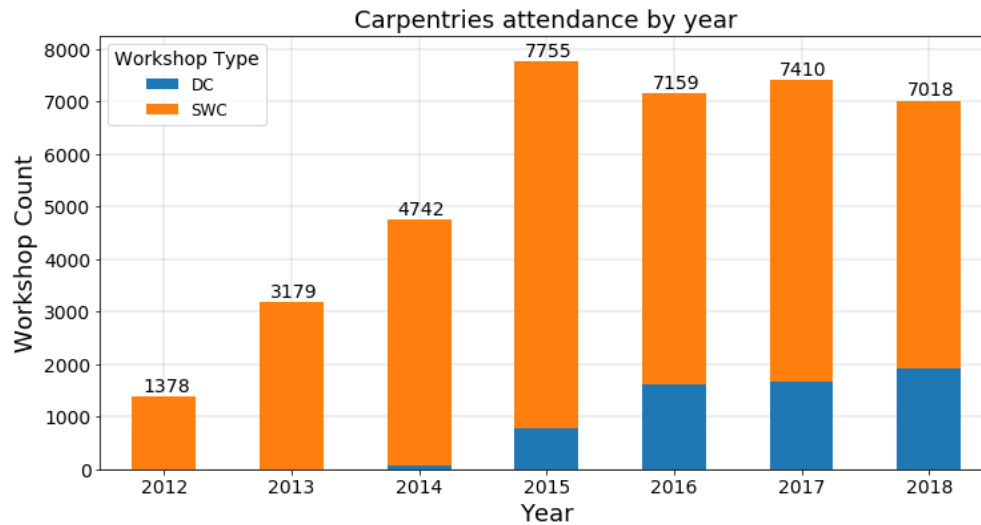


**Part 2: Learners**

## Figure 4: Workshop Attendance

This bar chart represents the total number of Software Carpentry (SWC) and Data Carpentry (DC) learners each year. Numbers for 2018 represent projected data. However, approximately 27% of 2018 workshops have unreported attendance. The Carpentries staff and workshop administrators are working to improve our data collection and reporting measures to have more complete and accurate attendance figures.

Source data can be found in Table 3 in the Appendix.



## Part 3: Instructor Training

### Overview

Over the last hundred years, researchers have discovered an enormous amount about how people learn and how best to teach them. Unfortunately, much of that knowledge has not yet been translated into common classroom practice, especially at the university level. To this goal, we offer an Instructor Training program.

This two-day class has the following overall goals:

- Introduce trainees to evidence-based best-practices of teaching.
- Teach how to create a positive environment for learners at Carpentries workshops.
- Provide opportunities for trainees to practice and build their teaching skills.
- Help trainees become integrated into the Carpentries community.
- Prepare trainees to use these teaching skills in teaching Carpentries workshops.

Because we have only two days, some things are beyond the scope of this class. We do not teach:

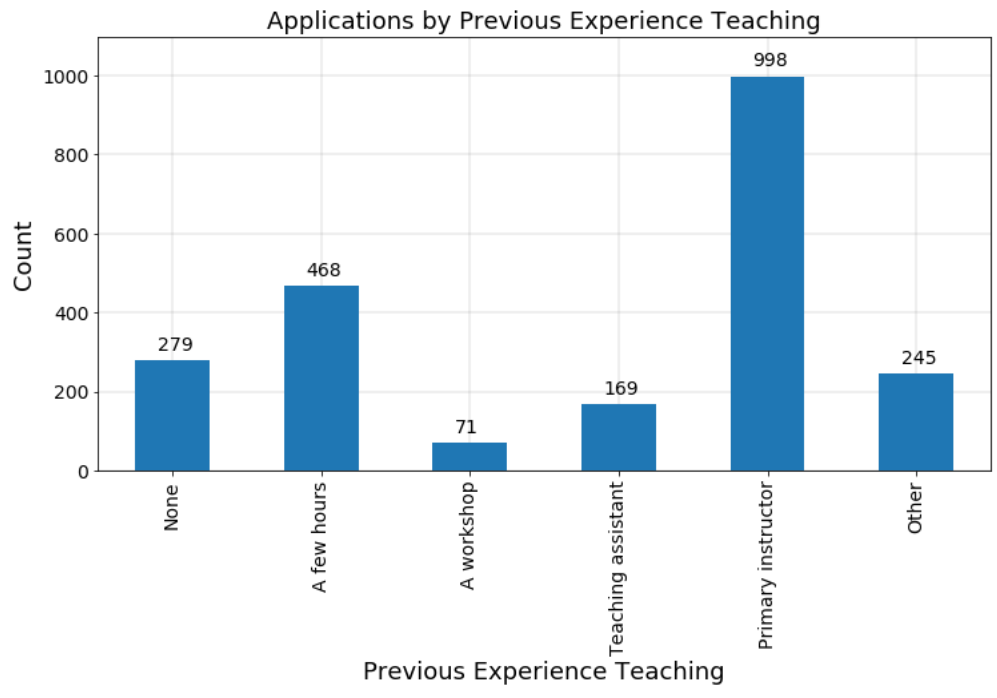
- How to program in R or Python, use git, or any of the other topics taught in Carpentries workshops.
- How to create lessons from scratch (although trainees will have a good start on the principles behind that sort of work if inspired to learn more).

This training is based on our constantly revised and updated curriculum (<https://carpentries.github.io/instructor-training/> (<https://carpentries.github.io/instructor-training/>)).

After completing the two day training program and several checkout exercises, trainees are awarded a badge and are considered certified Carpentries instructors, qualified to teach any of our workshops.

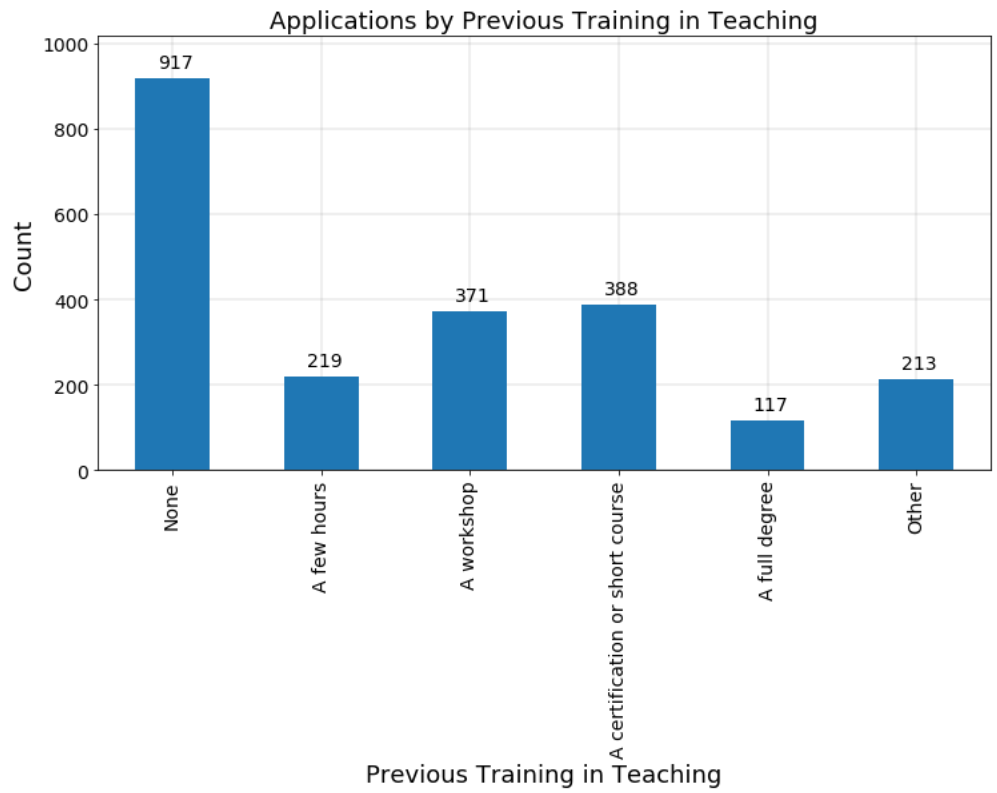
## Figure 5: Instructor Training Applications by Previous Experience in Teaching

Source data can be found in Table 4 of the Appendix.



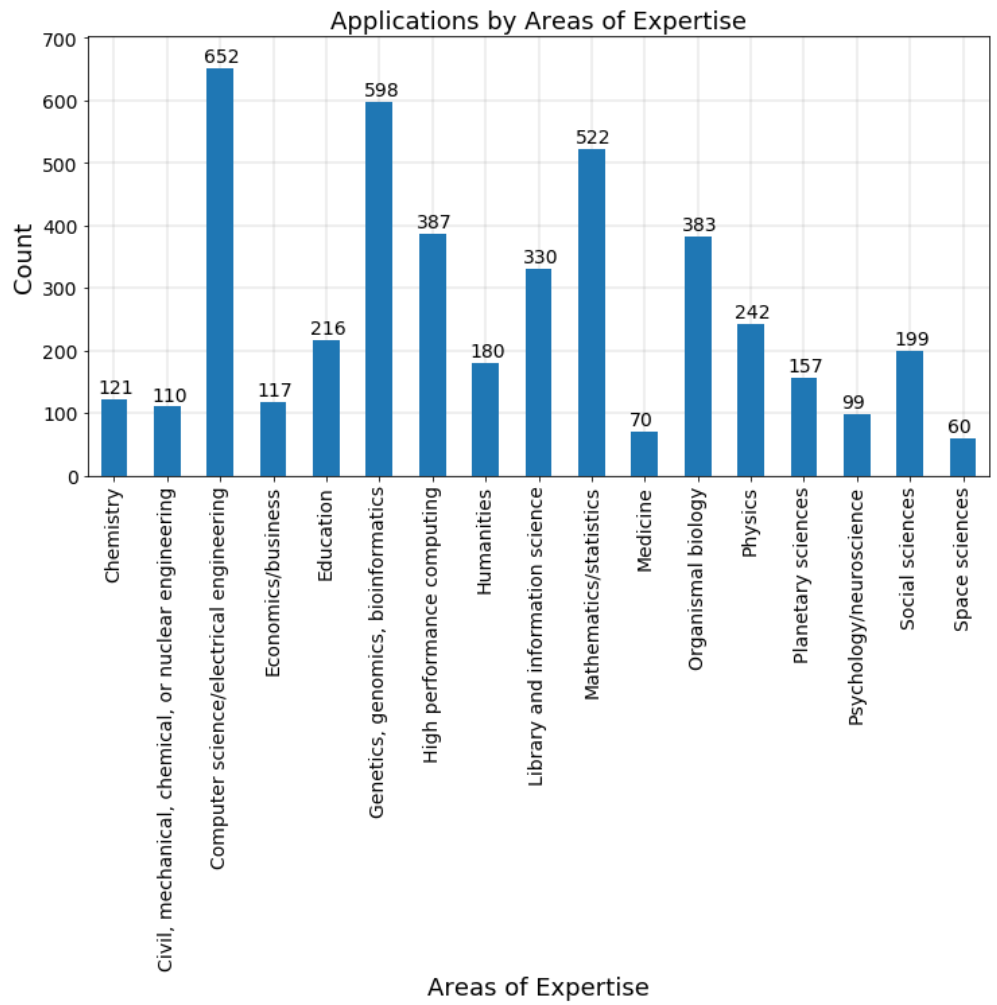
**Figure 6: Instructor Training Applications by Previous Training in Teaching**

Source data can be found in Table 5 of the Appendix.



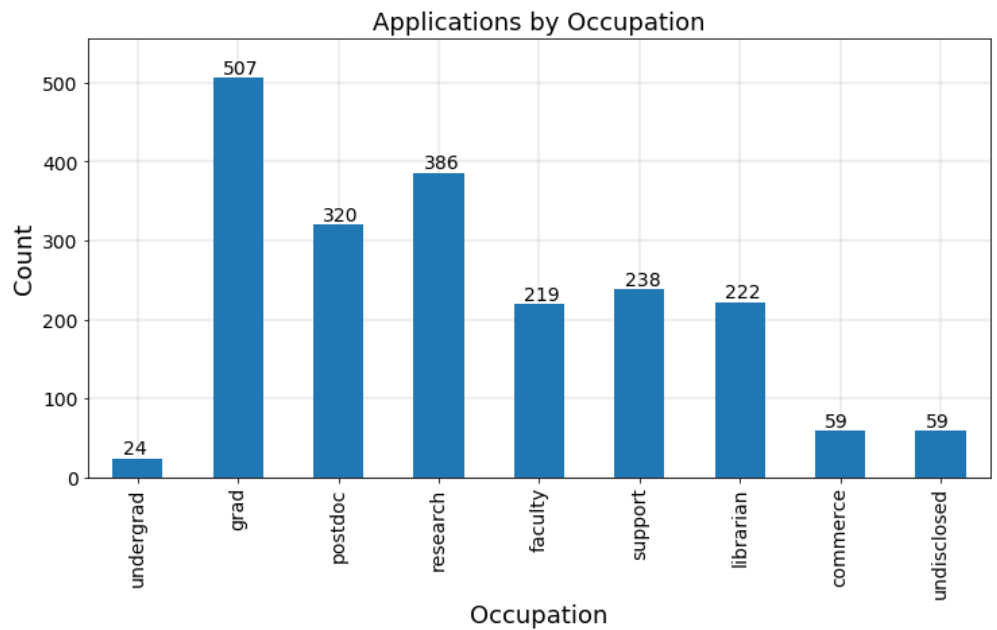
**Figure 7: Instructor Training Applications by Areas of Expertise**

Applicants can identify more than one area of expertise. Source data can be found in Table 6 of the Appendix.



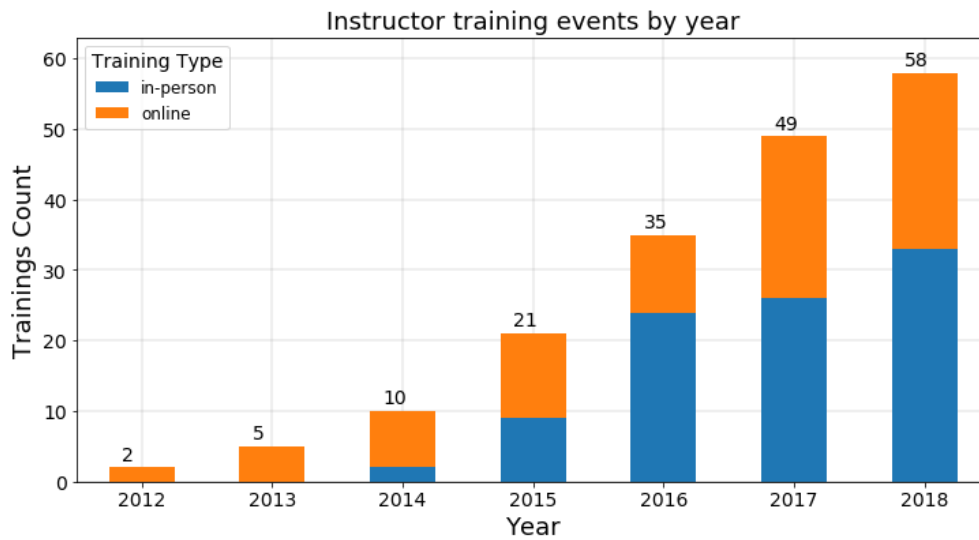
**Figure 8: Instructor Training Applications by Occupation**

Source data can be found in Table 7 of the Appendix.



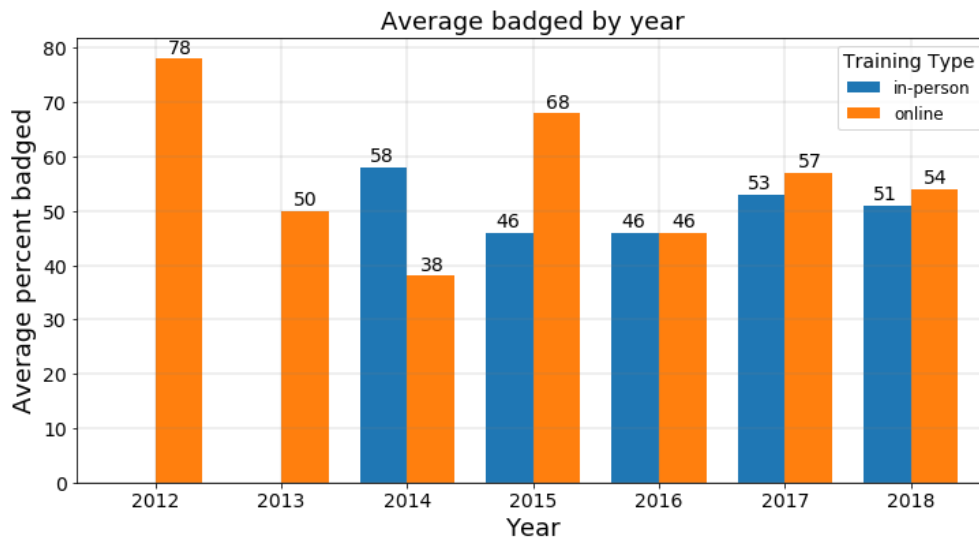
**Figure 9: Instructor Training Events**

Numbers for 2018 represent actual data through October 2018. Source data can be found in Table 8 of the Appendix.



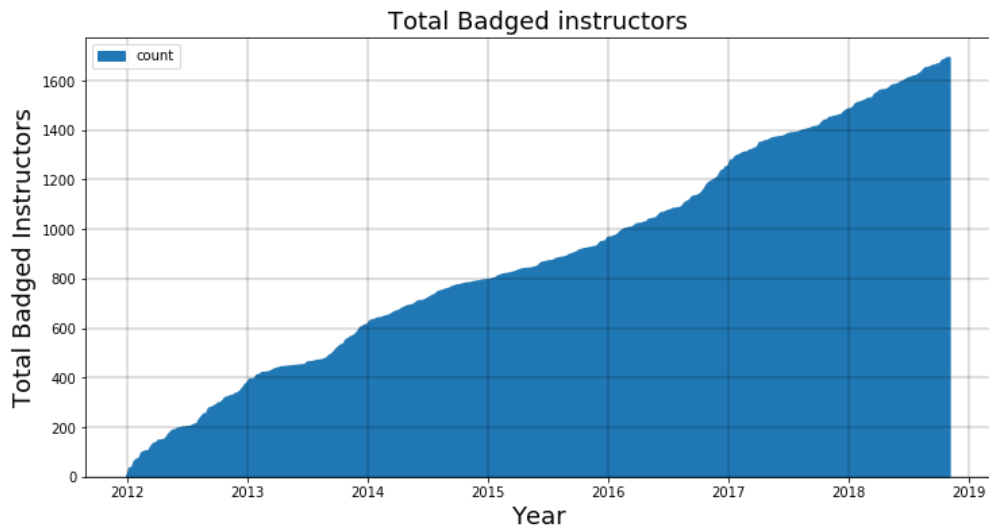
**Figure 10: Badging Rates at online vs. in-person events**

This chart shows the average of the percent badged each year. Badging rates are calculated as a percentage of those who were awarded an instructor badge after attending a training event. Source data can be found in Table 9 of the Appendix.



**Figure 11: Badged Instructors**

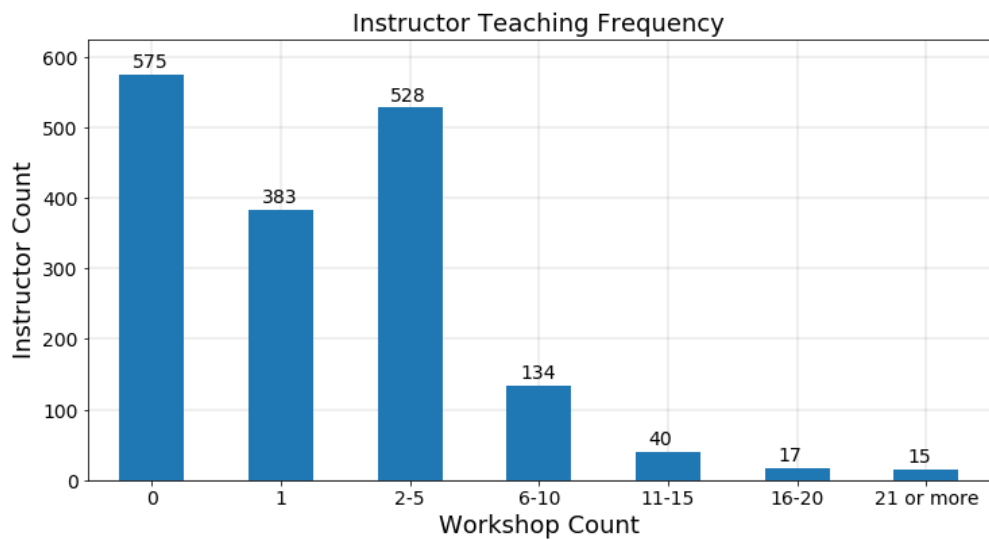
Cumulative count by year of all instructors badged through October 2018. As of October 2018, The Carpentries had a total of 1692 instructors.



## Part 4: Teaching

**Figure 12: Teaching Frequency**

Source data can be found in Table 10 of the Appendix.



## Part 5: Trainers

### Overview

Until 2016, all Instructor Training events were run as online events by the Software Carpentry founder and former Executive Director. Knowing the limitations of having only one Instructor Trainer, in 2016, The Carpentries launched a training program for Instructor Trainers (<https://carpentries.github.io/trainer-training/> ([https://carpentries.github.io/trainer-training\(\)](https://carpentries.github.io/trainer-training/))).

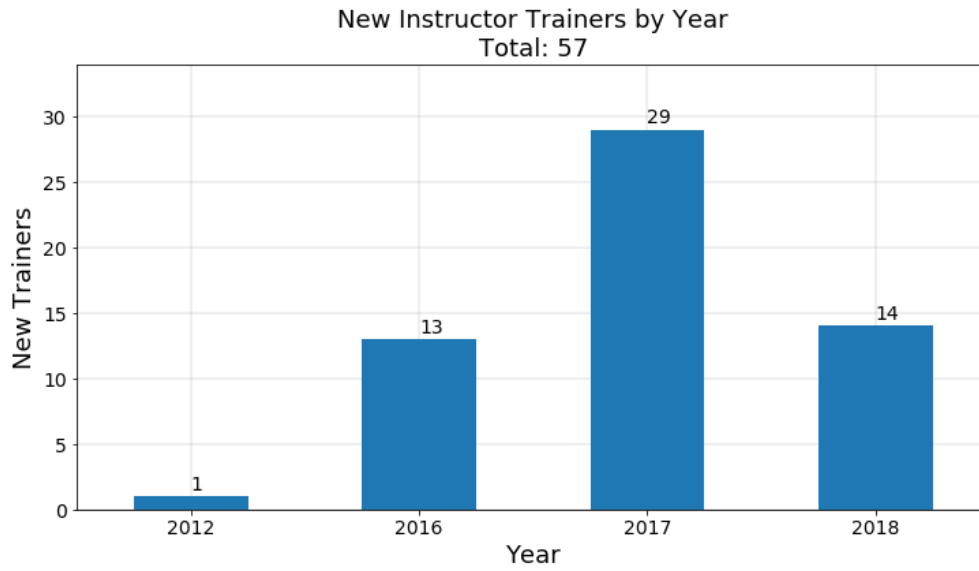
This allowed us to expand reach by running several events a month, across timezones for online events. It also allowed us to build capacity at member organizations who have onsite Instructor Trainers. These Trainers run events for their site, building a community of trained and certified instructors there.

By bringing on new Trainers in many parts of the world, we have a large community of Trainers who overlap time zones and connect with a wider audience. We've also expanded our geographic reach, allowing us to reach communities we may not otherwise connect with.



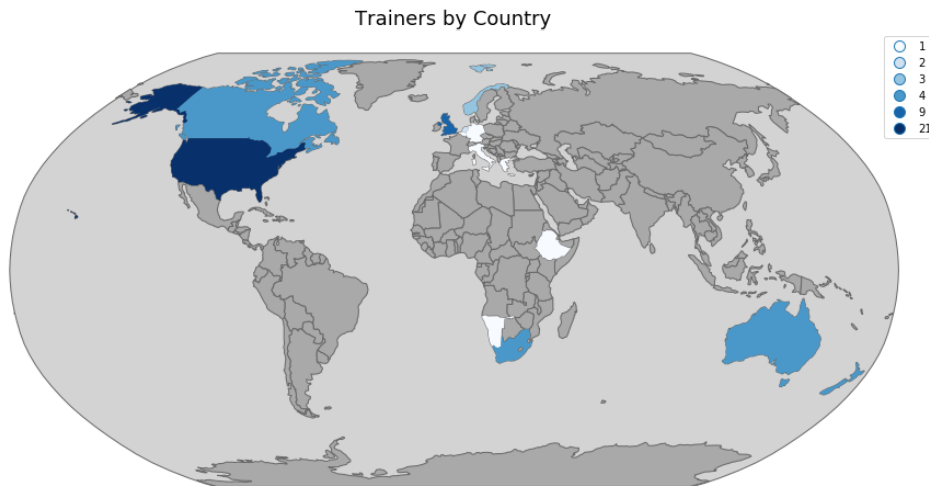
### Figure 13: New Trainers by Year

As of October 2018, The Carpentries has 57 Instructor Trainers on board. Source data can be found in Table 11 of the Appendix.



### Figure 14: Trainers by Country

Source data can be found in Table 12 of the Appendix.



## Appendix

Table 1: Workshops by Carpentry lesson program by Year

Workshop Type	DC	SWC	row total
Year			
2012	0	38	38
2013	0	92	92
2014	2	137	139
2015	31	243	274
2016	72	273	345
2017	81	257	338
2018	121	294	415
column total	307	1334	1641

**Table 2: Workshops by Country by Year**

Year	2012	2013	2014	2015	2016	2017	2018	row total
Country								
Antarctica	0	0	0	0	0	0	1	1
Australia	0	6	10	32	41	34	29	152
Belgium	0	0	0	1	0	1	2	4
Botswana	0	0	0	0	0	1	0	1
Brazil	0	0	6	5	5	0	1	17
Canada	8	11	22	25	41	29	22	158
China	0	1	0	0	0	0	0	1
Colombia	0	0	0	0	1	0	0	1
Cyprus	0	0	1	0	0	0	0	1
Denmark	0	0	1	0	2	2	1	6
Ethiopia	0	0	0	0	0	4	23	27
Finland	0	0	0	2	0	0	2	4
France	1	2	0	1	3	0	2	9
Gabon	0	0	0	0	0	1	0	1
Germany	0	3	3	4	4	9	8	31
Ghana	0	0	1	0	0	1	0	2
Greece	0	0	0	0	1	0	1	2
India	0	0	0	1	0	0	1	2
Indonesia	0	0	0	1	0	0	0	1
Ireland	0	0	0	0	0	0	2	2
Italy	1	0	1	0	2	0	2	6
Jordan	0	0	1	0	0	0	0	1
Kenya	0	0	0	1	1	0	0	2
Korea, Republic of	0	0	0	4	1	0	1	6
Lebanon	0	1	0	0	0	0	0	1
Mauritius	0	0	0	0	0	1	0	1
Mexico	0	0	0	0	1	1	1	3
Namibia	0	0	0	0	1	1	0	2
Netherlands	0	1	0	3	2	2	8	16
New Zealand	0	1	0	7	14	9	4	35
Norway	1	1	1	4	5	1	2	15
Pakistan	0	0	0	0	0	0	1	1
Philippines	0	0	0	0	1	0	0	1
Poland	0	1	1	2	4	1	0	9
Portugal	0	0	0	0	0	0	1	1
Puerto Rico	0	0	0	0	1	0	2	3
Saudi Arabia	0	1	0	0	0	0	0	1
Slovenia	0	0	0	1	0	0	0	1
South Africa	0	1	1	5	6	11	18	42
Spain	0	0	1	1	1	2	1	6
Sudan	0	0	0	0	0	0	1	1
Sweden	0	0	1	1	1	1	5	9

Year	2012	2013	2014	2015	2016	2017	2018	row total
Country								
Switzerland	0	0	2	4	5	2	2	15
Thailand	0	0	0	1	0	1	0	2
United Kingdom	7	14	21	27	37	44	47	197
United States	20	48	65	140	164	179	215	831
Venezuela, Bolivarian Republic of	0	0	0	1	0	0	0	1
unknown	0	0	0	0	0	0	3	3
column total	38	92	139	274	345	338	409	1635

**Table 3: Attendance by Carpentry lesson program by Year**

Workshop Type	DC	SWC	row total
Year			
2012	0	1378	1378
2013	0	3179	3179
2014	59	4683	4742
2015	790	6965	7755
2016	1604	5555	7159
2017	1659	5751	7410
2018	1930	5088	7018
column total	6042	32599	38641

**Table 4: Instructor Training Applications by Previous Experience Teaching**

	Count
Previous Experience	
None	279
A few hours	468
A workshop	71
Teaching assistant	169
Primary instructor	998
Other	245
column total	2230

**Table 5: Instructor Training Applications by Previous Training in Teaching**

	Count
<b>Previous Training</b>	
None	917
A few hours	219
A workshop	371
A certification or short course	388
A full degree	117
Other	213
<b>column total</b>	<b>2225</b>

**Table 6: Instructor Training Applications by Areas of Expertise**

Totals are not included as applicants can select more than one area of expertise.

	Count
<b>Expertise areas</b>	
Chemistry	121
Civil, mechanical, chemical, or nuclear engineering	110
Computer science/electrical engineering	652
Economics/business	117
Education	216
Genetics, genomics, bioinformatics	598
High performance computing	387
Humanities	180
Library and information science	330
Mathematics/statistics	522
Medicine	70
Organismal biology	383
Physics	242
Planetary sciences	157
Psychology/neuroscience	99
Social sciences	199
Space sciences	60

**Table 7: Instructor Training Applications by Occupation**

	Count
<b>Occupation</b>	
undergrad	24
grad	507
postdoc	320
research	386
faculty	219
support	238
librarian	222
commerce	59
undisclosed	59
column total	2034

**Table 8: Instructor Training Events by Year**

Type	in-person	online	row total
<b>Year</b>			
2012	0	2	2
2013	0	5	5
2014	2	8	10
2015	9	12	21
2016	24	11	35
2017	26	23	49
2018	33	25	58
column total	94	86	180

**Table 9: Average Badged by Instructor Training Event Type by Year**

Percent Badged	in-person	online
<b>Year</b>		
2012	0	78
2013	0	50
2014	58	38
2015	46	68
2016	46	46
2017	53	57
2018	51	54

**Table 10: Instructor Teaching Frequency**

		count
	<b>workshops taught</b>	
<b>count</b>	<b>0</b>	575
	<b>1</b>	383
	<b>2-5</b>	528
	<b>6-10</b>	134
	<b>11-15</b>	40
	<b>16-20</b>	17
	<b>21 or more</b>	15

**Table 11: New Instructor Trainers by Year**

	count
<b>year</b>	
<b>2012</b>	1
<b>2016</b>	13
<b>2017</b>	29
<b>2018</b>	14
<b>column total</b>	57

**Table 12: Instructor Trainers by Country**

	count
<b>country</b>	
<b>Australia</b>	4
<b>Belgium</b>	1
<b>Canada</b>	4
<b>Ethiopia</b>	1
<b>Germany</b>	1
<b>Greece</b>	1
<b>Italy</b>	1
<b>Namibia</b>	1
<b>Netherlands</b>	2
<b>New Zealand</b>	4
<b>Norway</b>	3
<b>South Africa</b>	4
<b>United Kingdom</b>	9
<b>United States</b>	21
<b>column total</b>	57