
Fall Data Challenge 2023



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Why are Coding Bootcamps Important?

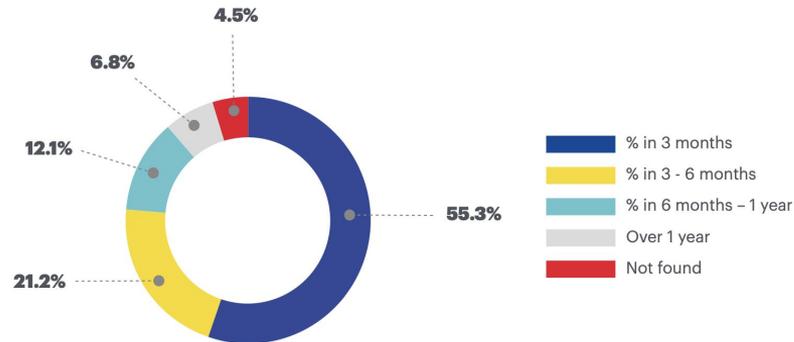
- Coding bootcamps provide an **alternate path** into the software industry and a **second chance** for those who missed previous computing education opportunities (Thayer & Ko, 2017)
- ~**75%** of bootcamp graduates are able to obtain employment **within 6 months**

Main Goals of Our Study

1. Recommend two coding languages to immediately begin teaching
2. Initiate planning for a third language to teach in the future
3. Provide insights on the coding bootcamp business model

Job placement of bootcamp-trained professionals by time period 2020

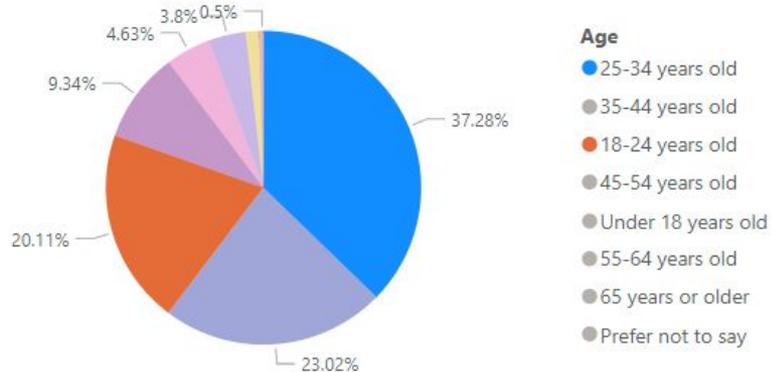
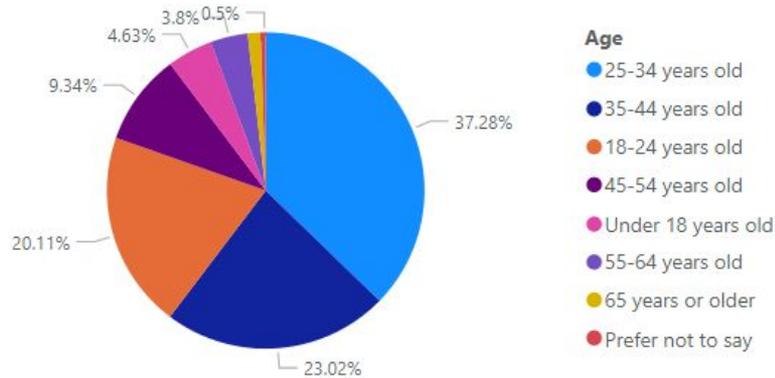
2020



From (Barcelona Digital Talent, 2020)

Note: Every instance of external data is sourced and referenced on the slide as well as in a bibliography at the end of the presentation—all unsourced data and visualizations are from the 2023 Stack Overflow Developer Survey as provided by the American Statistical Association

Age Demographics for Career-Changers



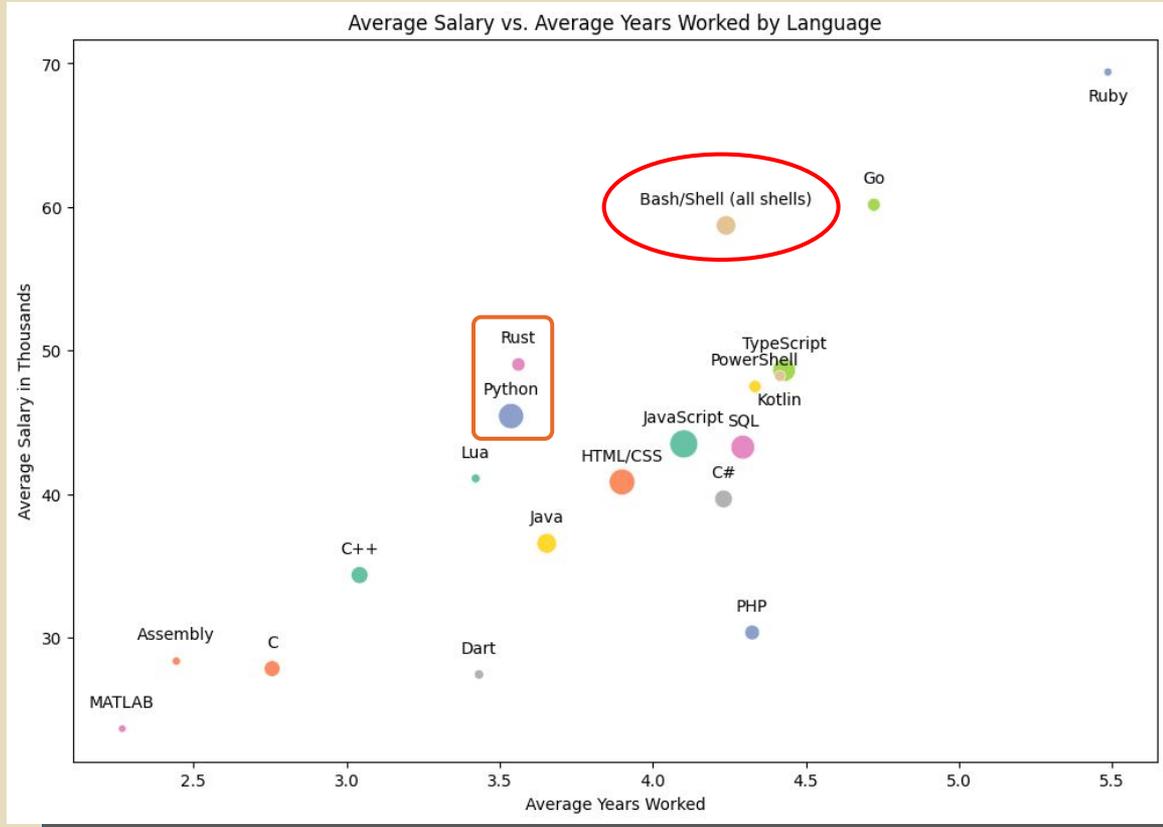
- The Stack Overflow Developer Survey (SODS) contained age groups from under 18 to 65+
- Focusing on **ages 18-34** since the majority of bootcamp participants changed careers within this range (Seibel & Veilleux, 2019)
- Analyzed *languages learned*, *yearly compensation*, and *years of professional programming experience*

Data Cleaning Process

1. Filtered to only include respondents of ages 18-34
2. Used survey schema layout to exclude irrelevant questions and answers
3. Created new columns for delimited data
4. Removed invalid responses
5. Filtered data using Python and Pandas

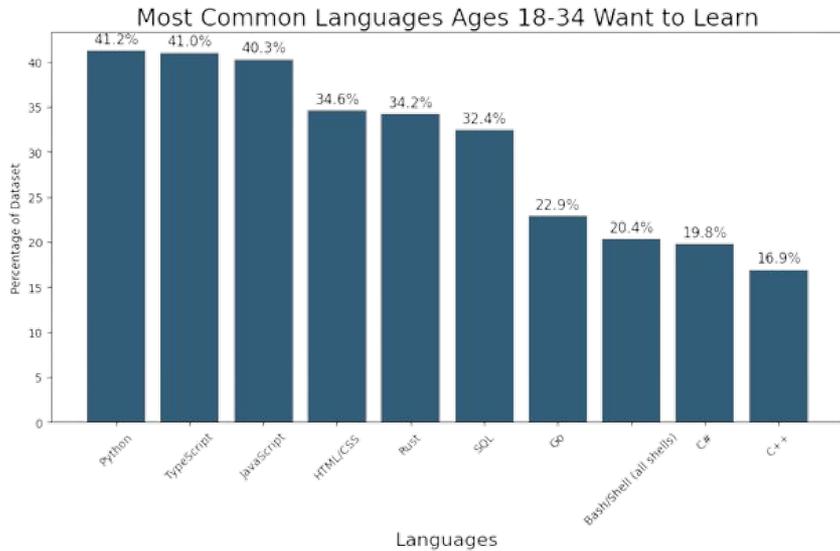
Languages vs Salary

- **Python** and **Rust** produce the highest average salaries within **3.5 years of experience**
- **TypeScript**, **SQL**, **JavaScript** provide a similar average salary, but within 4.0 to 4.5 years of experience
- **Bash/Shell** greatly surpasses TypeScript and JavaScript in average salary within that same timeframe



Note: Dot size is proportional to the number of respondents who have worked with that respective programming language

Common Languages



Python, TypeScript, and JavaScript are the most popular languages our age group aspires to learn

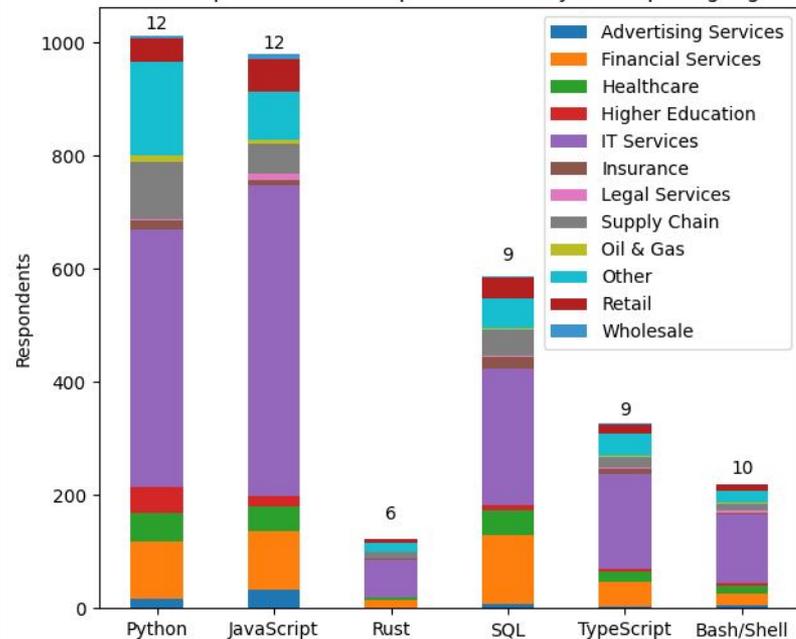
- **Python, TypeScript, JavaScript, Rust, SQL, and Bash/Shell** are all within the top ten most common languages our age group wants to learn

Why are these languages in demand?

Python	User-friendly, used in numerous applications
TypeScript	More convenient version of JavaScript
JavaScript	Highly adaptable, productive, and reliable
Rust	Focused on speed and security to maximize efficiency
SQL	Essential to learn, highly utilized in database dev.
Bash/Shell	Scripting tool to automate tasks relating to code

Industry Use of Languages

Industries that Respondents with Experience in only one Top Language Worked In



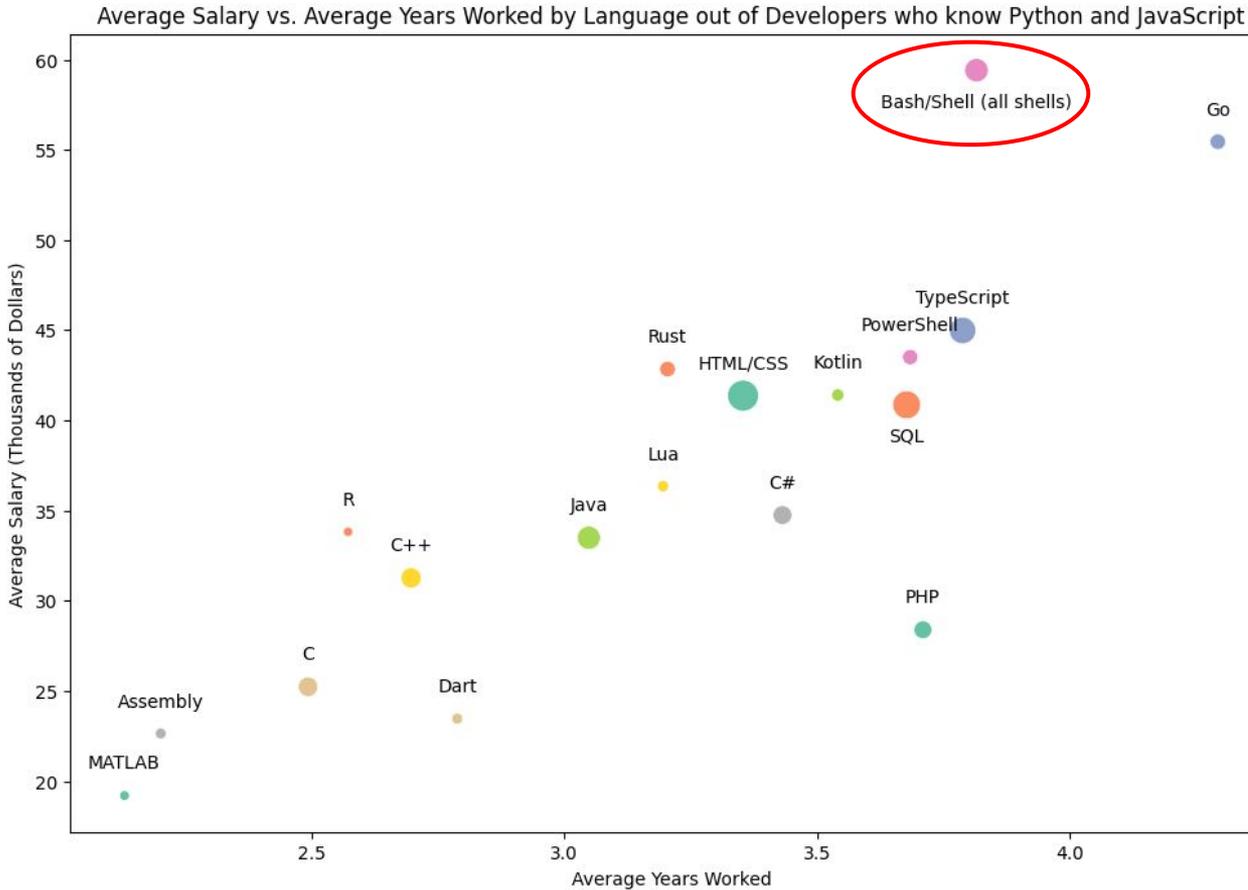
Note: Data labels describe the number of industries that include at least three respondents

- Heavy usage of **Python** and **JavaScript** among numerous industries makes it useful for career-changers to learn
- **Rust** is very specialized and lacks relevance across as many industries compared to other languages
- **SQL**, **TypeScript**, and **Bash** encompass less fields and are less prominent than **Python** and **JavaScript**, though they are still useful within many industries

We recommend teaching Python and JavaScript because of...

1. Higher salaries with less required experience
2. High demand among 18-34 year olds
3. Highest applicability within a variety industries

Third Language Selection



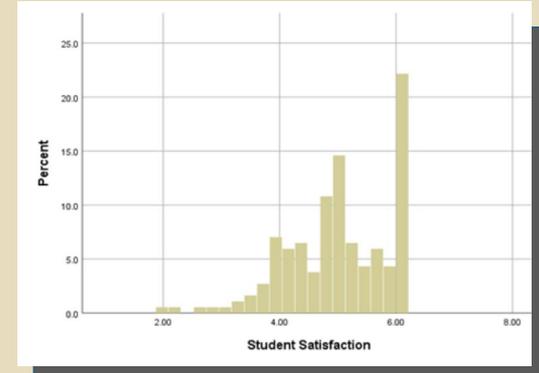
- **Bash** is highly used in the industry
- Avg. of **~3.8 years** worked equates to **highest salary among this dataset**
- Enticing for students who have learned Python and JavaScript
- Easy to market to the same target audience

Instruction Format

- **80%** of all respondents used **general online resources** when learning how to code, up almost 10% from 2022
- **50%** learn through **online courses**, while the rest learn through academic institutions
- Graphs on the right indicate that students consistently felt **more satisfied with synchronous classes** than asynchronous ones (Mohandas & Mentzer, 2021)
- Learning at home in **asynchronous contexts necessitates self-study skills** to stay on task and motivated to follow learning goals (Fabiz et al., 2021)
- At the same time, the University of the Potomac (n.d.) determined that 70% of all students felt that **online classes are “as good as or better than in a traditional classroom setting”**
- In addition, participants of **online and in-person coding bootcamps received very similar salaries** (Eggleston, 2021)

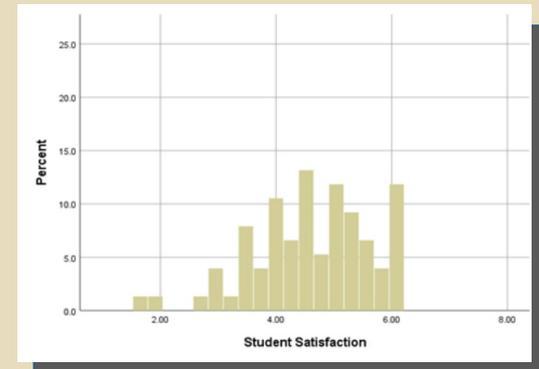
Due to these reasons, the bootcamp should take place in a virtual, synchronous format

Fully Synchronous



Mean: 4.98 || Std. Dev: 0.81 || N = 185

Asynchronous



Mean: 4.61 || Std. Dev: 0.99 || N = 76

Conclusions & Summary

- Coding bootcamps are a **quick and accessible** path to entering the programming field for career-switchers
- Data from **ages 18-34** is the most relevant for those who change careers and consists of the majority of the SODS
- Based on graphical analysis, **Python** and **JavaScript** are two languages that offer solid salaries among a variety of industries within a relatively short period of time for bootcamp graduates
- **Bash/Shell** should be implemented further down the line due to its high salary correspondence among **Python** and **Javascript** users, allowing us to target the same demographics/consumer base
- The bootcamp should be **virtual and synchronous** in order to maximize information retention and accessibility, while minimizing cost and price

Limitations

1. The Stack Overflow Developer Survey only captures data for 2023, and does not provide insights into changes in variables over the past years
2. The accuracy of external data is difficult to measure, though we ensured our sources were relevant and trusted in the bootcamp field

Implications

- Using the data, visualizations, and recommendations from this study, aspiring bootcamps can reassess and improve their business models
- Current and future software developers can understand the value and desire behind various programming languages

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Graphs made using Power Bi, Python, Pandas, Matplotlib, and Seaborn.
Code on GitHub: <https://github.com/ani-tiwary/ASAFallDataChallenge>