



What are the prerequisites for GPT-4 to enable students to code?

Andrea Lincoln Assistant Professor CS

BE INSPIRED BY NEW IDEAS.

First thoughts

GPT-4 is an incredible coding assistant

LLMs more generally are actively in-use by all the software engineers I know

Estimates vary but there is probably a 30% speed up in developer productivity

On a personal note CSS is used to make websites and LLMs write a lot of it for now *despite me not knowing how to code in CSS*. Often I can't explain all of the CSS produced.



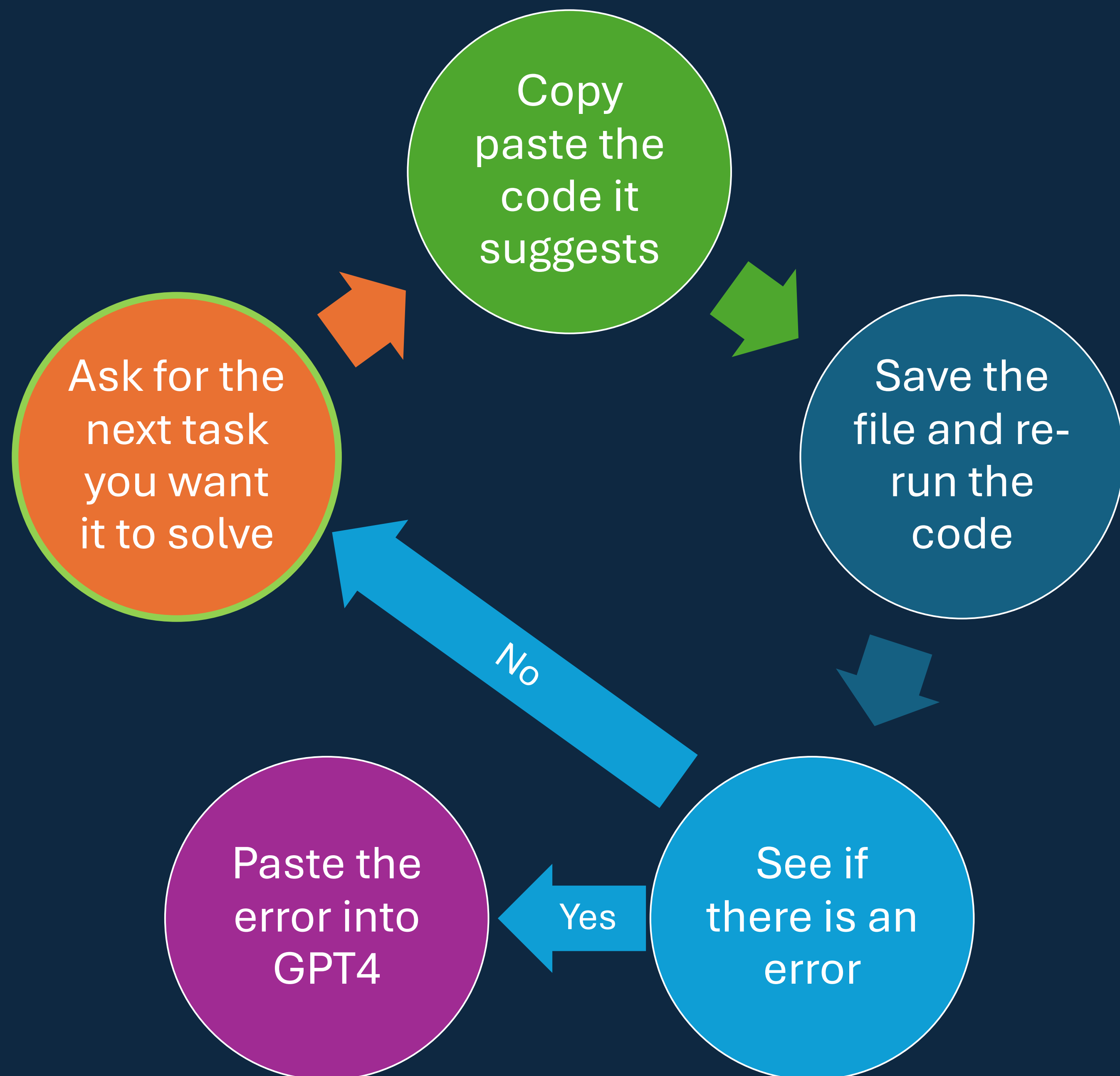
Thanks to ChatGPT for image

What were the first goals?

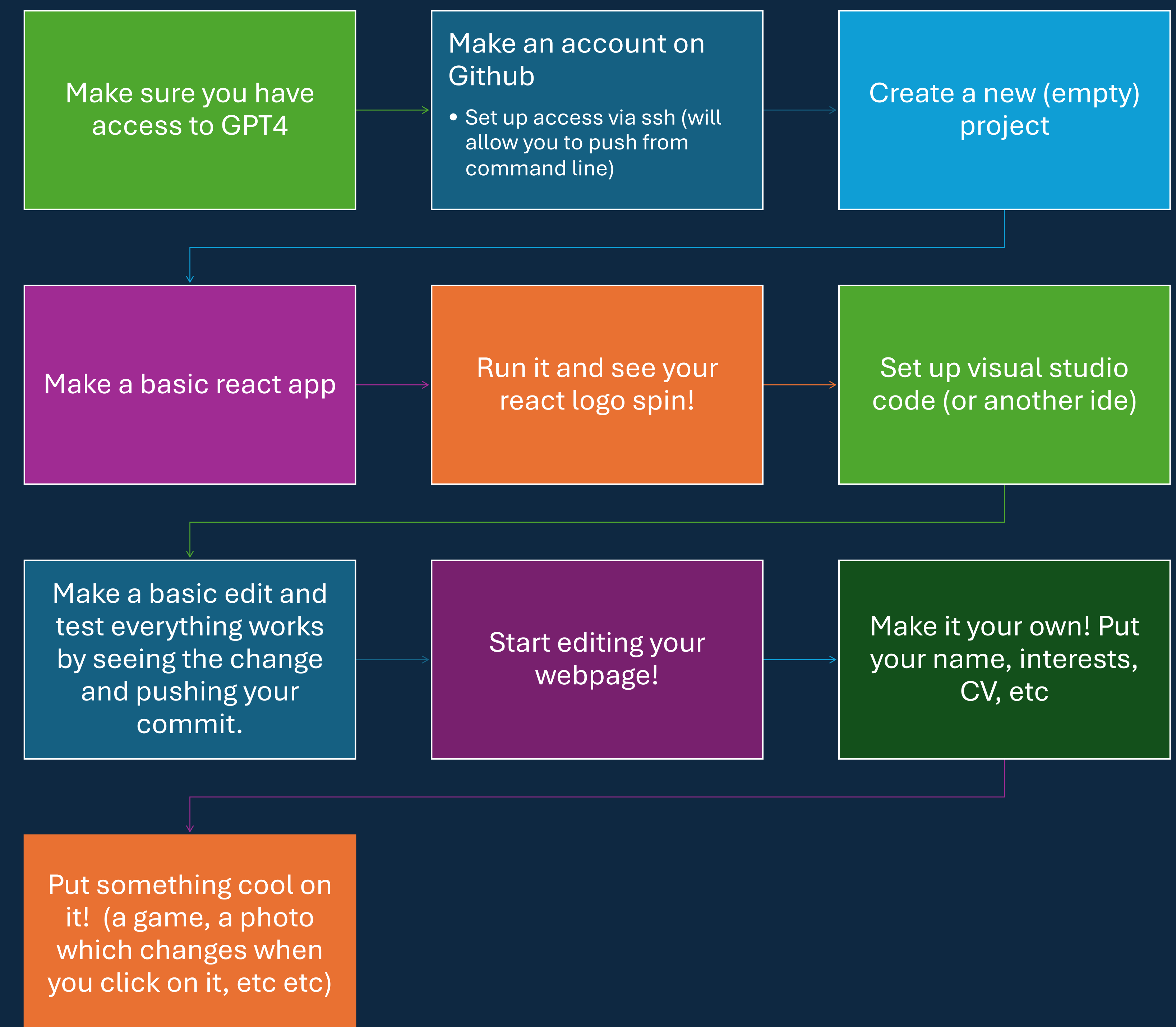
- To take in a group of students with varied backgrounds and see how GPT-4 can help them code
 - . I took in 10 students who had never coded before, students with limited experience, sophomores in computer science, and a junior in computer science
- I wanted to determine if in 9 hours they could:
 - . Make a Github account
 - . Make an ssh key and give their public key to Github
 - . Create a Javascript react personal website
 - . Deploy the website from the command line via Github pages (allowing the website to be publicly viewable)
- Notably, could students do new things they couldn't before?
- I was hoping that students with limited or no background would be able to code in a way that would scale
 - . E.g. 100 person class with 2 instructors

What Direction Was Given?

I started by explaining the goals, and giving advice on how to code with ChatGPT



I also gave a plan of what we were trying to do in nine hours



What did I find?

Students who had background in coding from before ChatGPT to ChatGPT immediately

- E.G. a junior who had never written in any of languages we were using and had never made a frontend was able to
 - Make a maze game from-scratch to play in browser
 - Make a website where you could upload a CSV of schedules and the website would display them and compute a good time to meet
 - Make an animated model of the solar system which ran in the browser
- While learning one language makes learning new languages faster, this is another level entirely

Students with less background were still able to make personal websites and use version control however, they quite reasonably needed more input. Notably:

- Most tools for coding look sort of suspicious
- Copying and pasting code from ChatGPT and running it when you don't understand it is scary (**AS IT SHOULD BE**)
- Figuring out what to say or how to explain errors can be confusing
- What software is or isn't trustworthy is confusing without experience



Delta compress
Compressing ob
Writing object

DEV Community
<https://dev.to/amitkhonde/eval-is-evil-why-we-should-not-use-eval-in-javascript>

Eval is evil - Why we should not use eval in JavaScript

Jun 3, 2021 — Usage of eval involves **pretty high risks of running malicious code**. Let us say you are accepting an expression from the user in an input box.

Ned Batchelder
https://nedbatchelder.com/blog/eval_really_is_dangerous.html

Eval really is dangerous

Jun 6, 2012 — eval() is tempting, **but it's truly dangerous**. Here's how common safety attempts can be circumvented.

DigitalOcean
<https://www.digitalocean.com/tutorials/js-eval/>

Reasons Why You Should Never Use eval() in JavaScript

Aug 25, 2019 — You likely don't see it often anymore because **it's widely agreed that it's harmful to use**. ... The keyword eval is an abbreviation for "evaluate".

Step 3: Add Your SSH Key to the ssh-agent

First, start the ssh-agent in the background:

```
bash
eval "$(ssh-agent -s)"
```

Then, add your SSH private key to the ssh-agent:

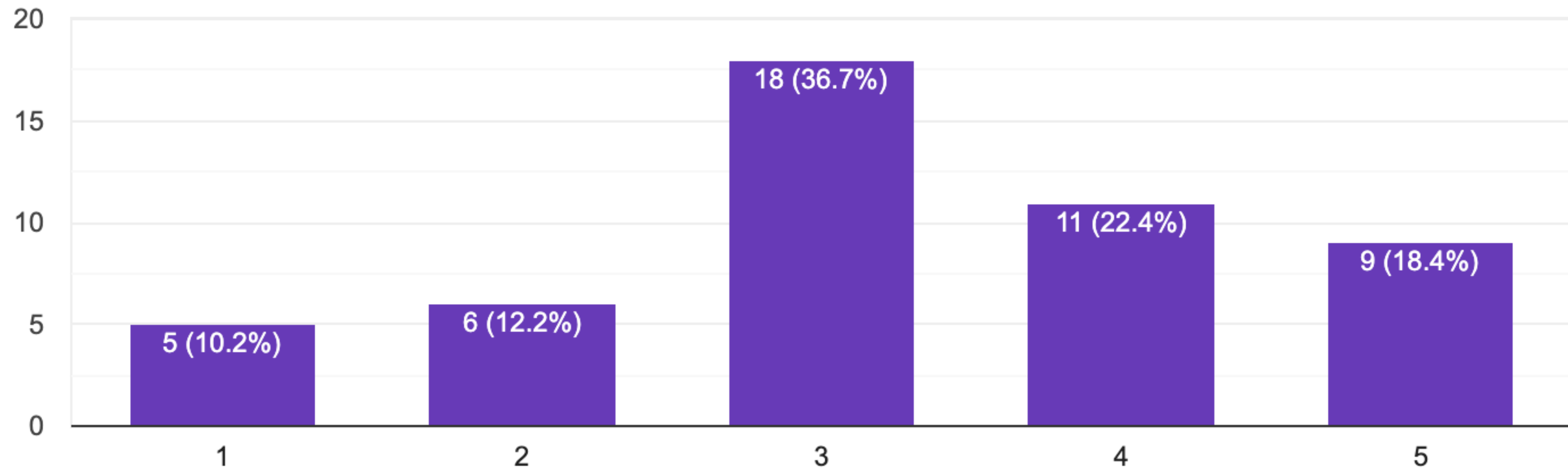
```
bash
ssh-add ~/.ssh/id_ed25519
```

Replace `id_ed25519` with your file name if different.

[General] On a scale from totally uncomfortable to totally fluent how comfortable do you feel with programming?



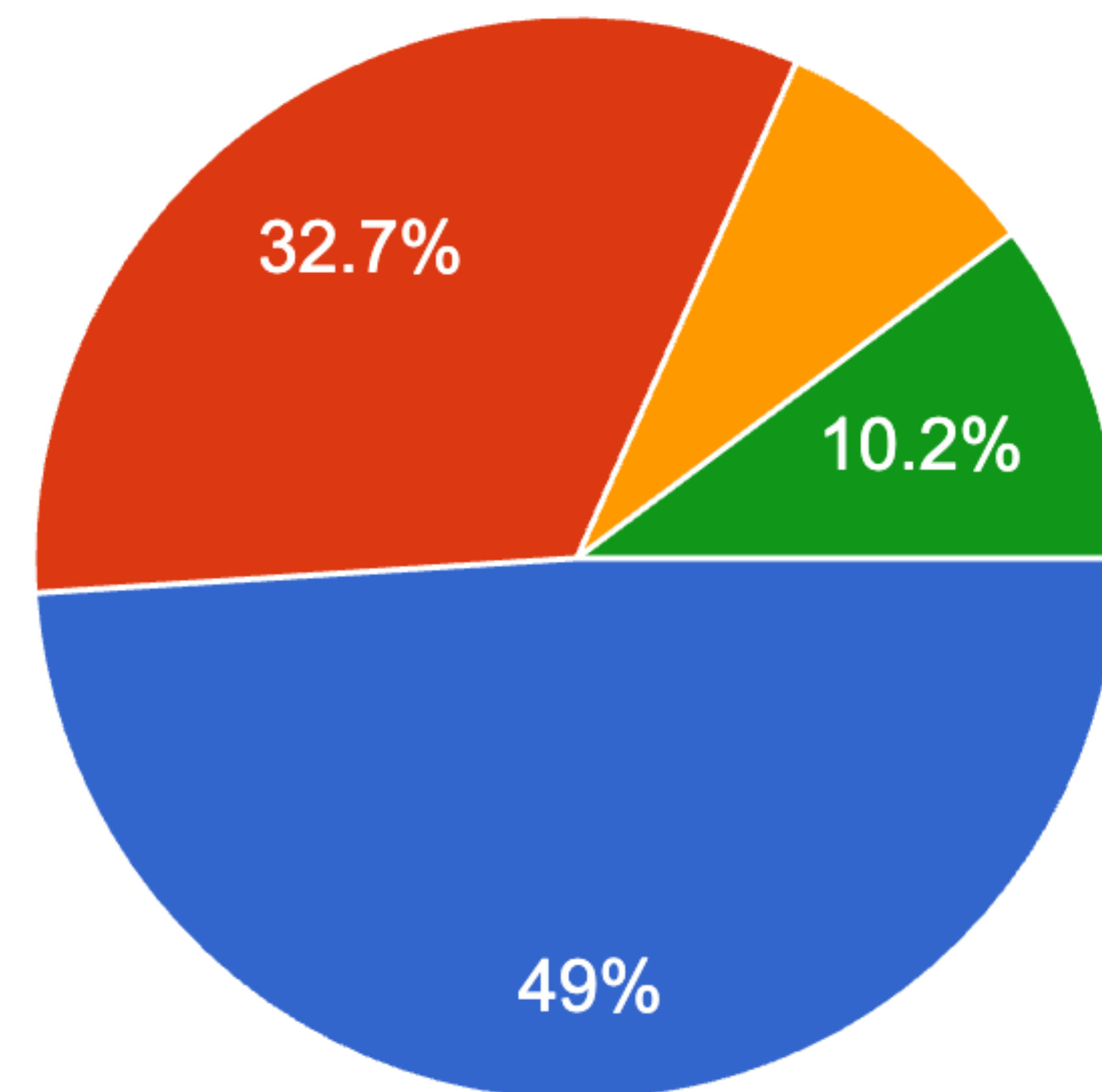
49 responses



Highlights from my initial survey responses
(From the 49 students who were interested)

[Specific] My background in Javascript and/or React is best described as:

49 responses

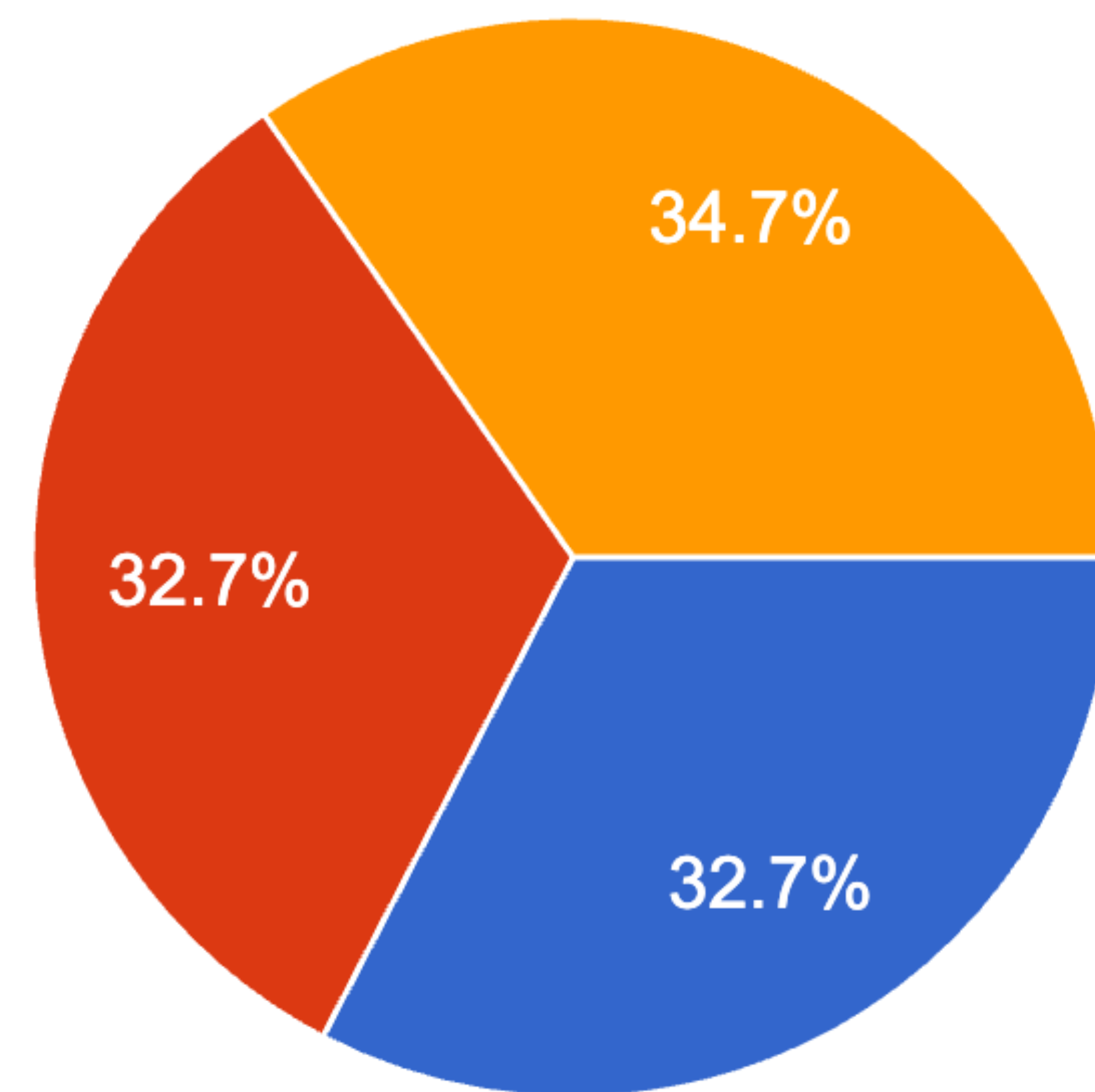


- None OR I don't know what Javascript or React are.
- I have edited code in a frontend, but, never made one from scratch
- I have made a website from scratch before but not in Javascript
- I have made a website from scratch before in Javascript

Highlights from my initial survey responses
(From the 49 students who were interested)

[Specific] My background with the command line is best described as:

49 responses



- What is the command line? OR I have never used the command line.
- I have used the command line for simple things (e.g. running a python file from the command line)
- I use the command line regularly. (e.g. I know how to install packages from the command line and have done so before.)

Highlights from my initial survey responses
(From the 49 students who were interested)

Highlight responses from end: Did you learn anything you found helpful? + Feedback

I liked how the introduction lecture looked at how to better interact with GPT-4 and how the smaller nuances (like being "kind") could lead to different outcomes. This definitely helped me when I started asking it questions myself, even outside of this seminar course.

I really like Cursor

Yes! Using ChatGPT haha this was my first time using it and it made me realize how useful it can be.

yes! I learned how to set up a web page with 0 prior experience

I was surprised by how quickly I was able to build the website, I have tried to use React before and was very overwhelmed and not able to create any sort of product (and same with javascript in general) but I was able to do relatively complex things in almost no time at all. I think I would still need to learn how to use some javascript and react to make my website actually look exactly like what I want but maybe I could also not be using chat gpt to its full potential. It did feel like we were going a bit slow since I already have some background knowledge (I think CS210 is the class that prepared me the most for this)

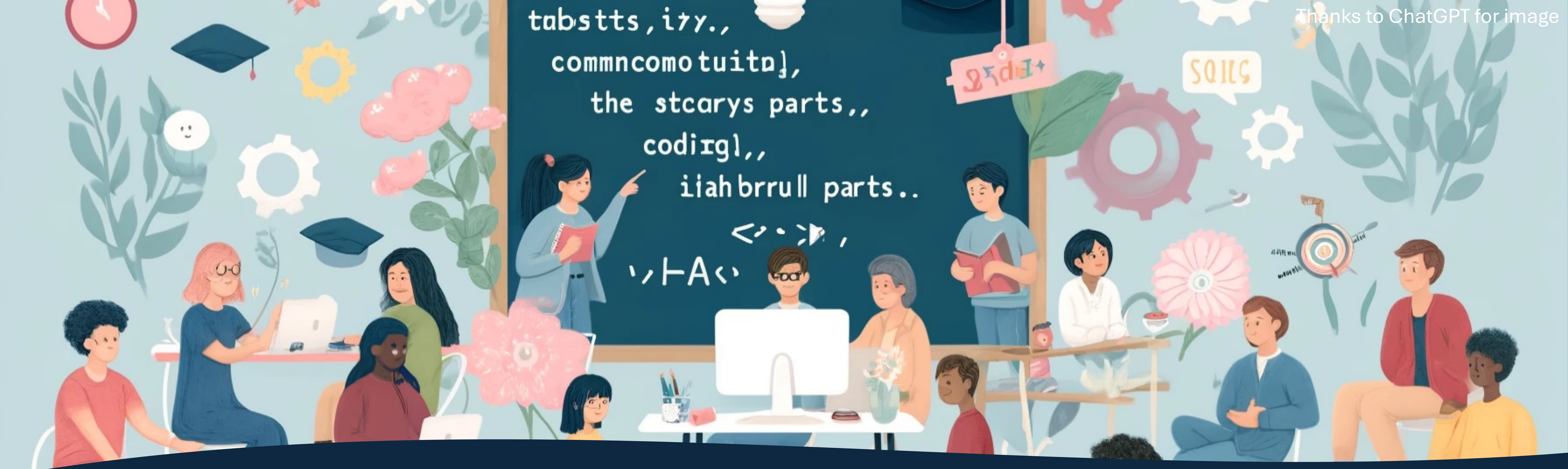
Highlight responses from end: What would help make this more effective? + Feedback

Terminology, why we are using certain software, and what we should know (example: this is safe)

It can be an only me problem but what it means to pull push commit ect I don;t have those in my vocaulary

Pairing students who already know about coding with students who don't know how to code could have sped up some paces.

I wish the "why" something works/"why" we are doing what we are doing was explained more. I find it easier to follow directions and learn new content when I have a stronger understanding of what I am doing. Sometimes during the process yesterday, it felt as if I was just copying and pasting lines of code because that is what ChatGPT generated, but I had no clue what the end result was supposed to be. More specifically, I felt this way when trying to set up the SSH key.



What I want to do next

- I still have enough funding to run something like this again
- Given that students with more background mostly need to be told “try it, it is awesome” I am primarily interested in trying to get students with more background up to speed
- I am currently trying to figure out ways to avoid some of the scarier parts while still enabling students to build things they couldn’t before
 - (e.g. should I run the command `eval "$(ssh-agent -s)”` in a sketchy looking terminal)
- I am planning to run the new version next year