THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

The Dual Nature of Generative AI Usage by Students

TWO CASE STUDIES EXPLORING STUDENT AGENCY MEDIATED BY AI IN CODING ASSESSMENTS IN HIGHER EDUCATION

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(on behalf of the GENIAL team)

Data Science Institute

Cambridge Generative AI in Education Conference
Cambridge, UK

16 October 2024

GENIAL: GENerative AI Tools as a Catalyst for Learning

A Collaborative Focus Group

https://lse-dsi.github.io/genial/

Background of the Project

- The project began as a **focus group** to explore students' experiences and perceptions of using generative AI tools in their learning process.
- This is a **collaborative project** involving several LSE departments:
  - Data Science Institute,
  - Department of Statistics,
  - Department of Management, and
  - School of Public Policy.
- **Timeline:** July 2023 – April 2024
- **Funding:** LSE Eden Centre Catalyst Fund & LSE Data Science Institute

Up: Francesca, Ghita

Bottom: Sara, Dorottya, Jon, Casey, Marcos and Maxwell

Left: Leonard (picture)

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Participating Courses

Case study	Autumn Term (Sep-Dec 2023)		Winter Term (Jan-Mar 2024)	
Undergraduate courses	DS105A – Data for Data Science	Quant	DS105W – Data for Data Science	Quant
	DS202A – Data Science for Social Scientists	Quant	DS202W – Data Science for Social Scientists	Quant
	ST207 – Databases	Quant	MG317 – Leading Organisational Change	Qual
Postgraduate courses			ST456 – Deep Learning	Quant
			PP422 – Data Science for Public Policy	Quant
			MG4B7 – Leading Organisational Change	Qual

Cohorts: 48 active participants (out of 200+) / *159 active participants (out of 300+)*

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Methodology & Data Collection

Autumn Term (Sep-Dec 2023)	Winter Term (Jan-Mar 2024)

• Initial survey on students' expectations/experience
• Focus on the use of GenAI in the classroom. Seminars had two moments:
  • No GenAI use
  • "Potential" use of GenAI use
• GenAI tools covered:
  • ChatGPT (3.5 only)
  • GitHub Copilot
• Students submitted chat logs and screenshots on certain days
• Final survey
	• Initial survey on students' expectations/experience
	• **Students were asked to always keep logs of their interactions with GenAI** (lectures, classes, assignments, reviewing, etc.)
	  • Chat logs captured every week in the weekly surveys
	• **Distinct "moments":**
	  • On Weeks 01-05: no guidance, no tips
	  • On Week 06: open lecture to reflect on the use of GenAI
	  • On weeks 07-11: tips and guidance for prompt engineering
	• GenAI tools covered:
	  • ChatGPT (3.5 and 4.0)
	  • Google Gemini (formerly Bard)
	• Focus Groups
	• Final Survey

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Preliminary Results: Prior Knowledge of Common GenAI Tools

Undergraduate Courses

	DS105A		DS105W		DS202A		DS202W		ST207		MG317	
	Heard about it	Have used it	Heard about it	Have used it	Heard about it	Have used it	Heard about it	Have used it	Heard about it	Have used it	Heard about it	Have used it
ChatGPT	16	15	38	37	21	19	24	22	17	17	11	11
Grammarly	16	8	37	23	21	15	22	14	17	11	12	11
Bing AI	9	5	15	3	15	4	15	4	9	7	4	1
DALL·E	7	4	13	6	9	5	10	7	9	5	6	3
Bard			15	7	12	2	14	4	7	3	4	3
GitHub Copilot			14	2	13	1	17	8	11	5	2	1
Midjourney	9	3	7	3	5	1	7	3	5	2	2	2
Claude					2	1					4	2
Consensus.ai					1	1						
Quillbot					1	1						
Stable Diffusion	1	1										

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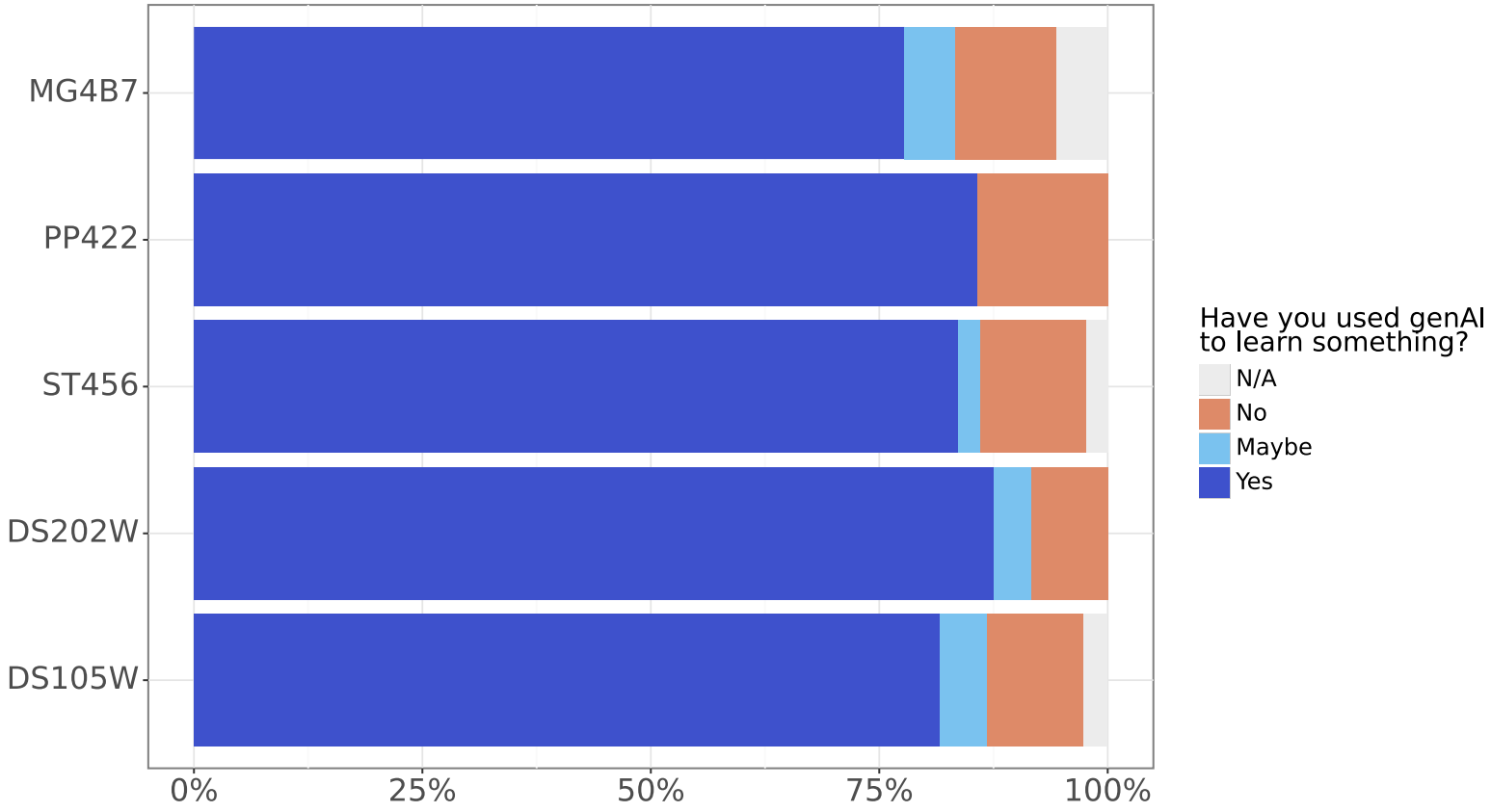
Preliminary Results: Have They Used it for Learning?

~80% of students reported having used a genAI tool to learn something

The proportions of 'Yes' are similar across courses



PP422 has fewer students

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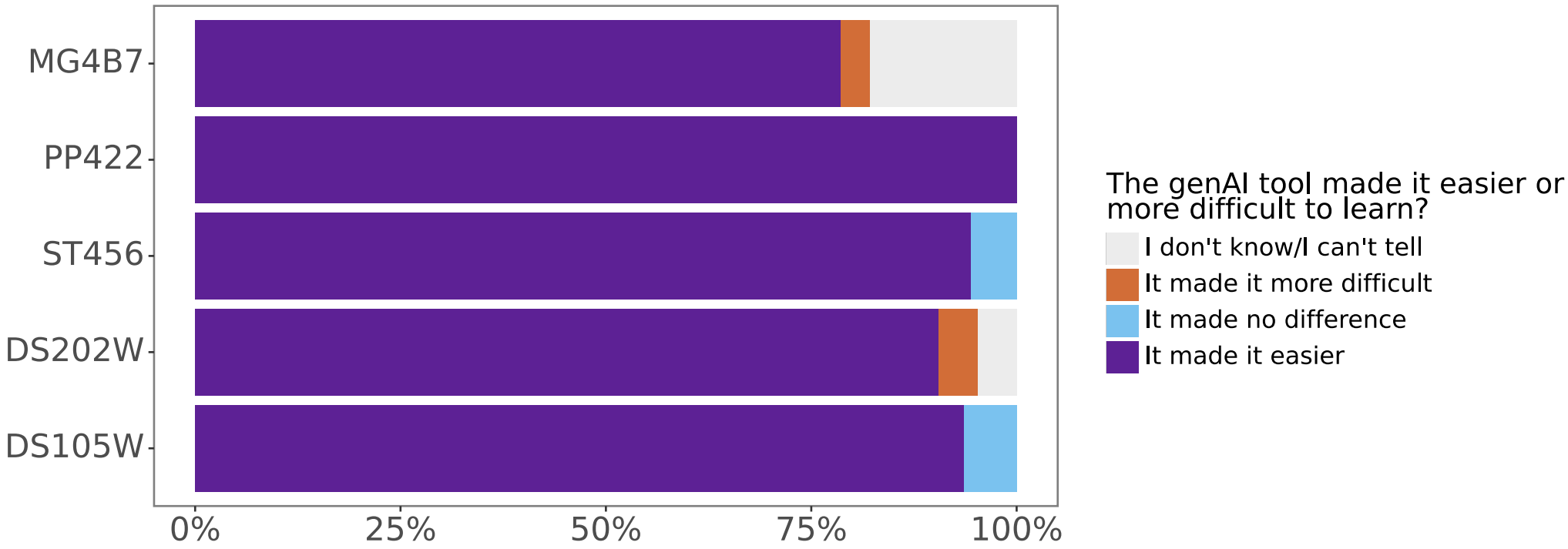
Preliminary Results: Have They Used it for Learning?

Of those who reported using genAI for learning, most found it useful

GenAI use is similar across courses



Note: For students enrolled in multiple courses, we allocated them to just one of their reported courses.

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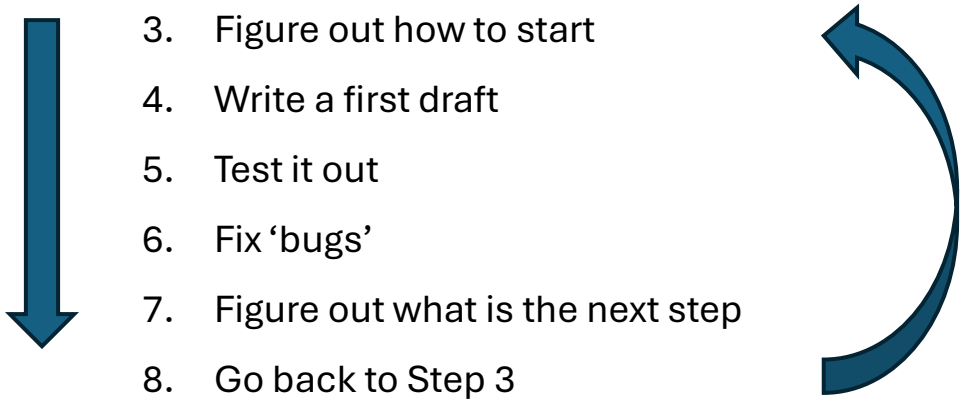
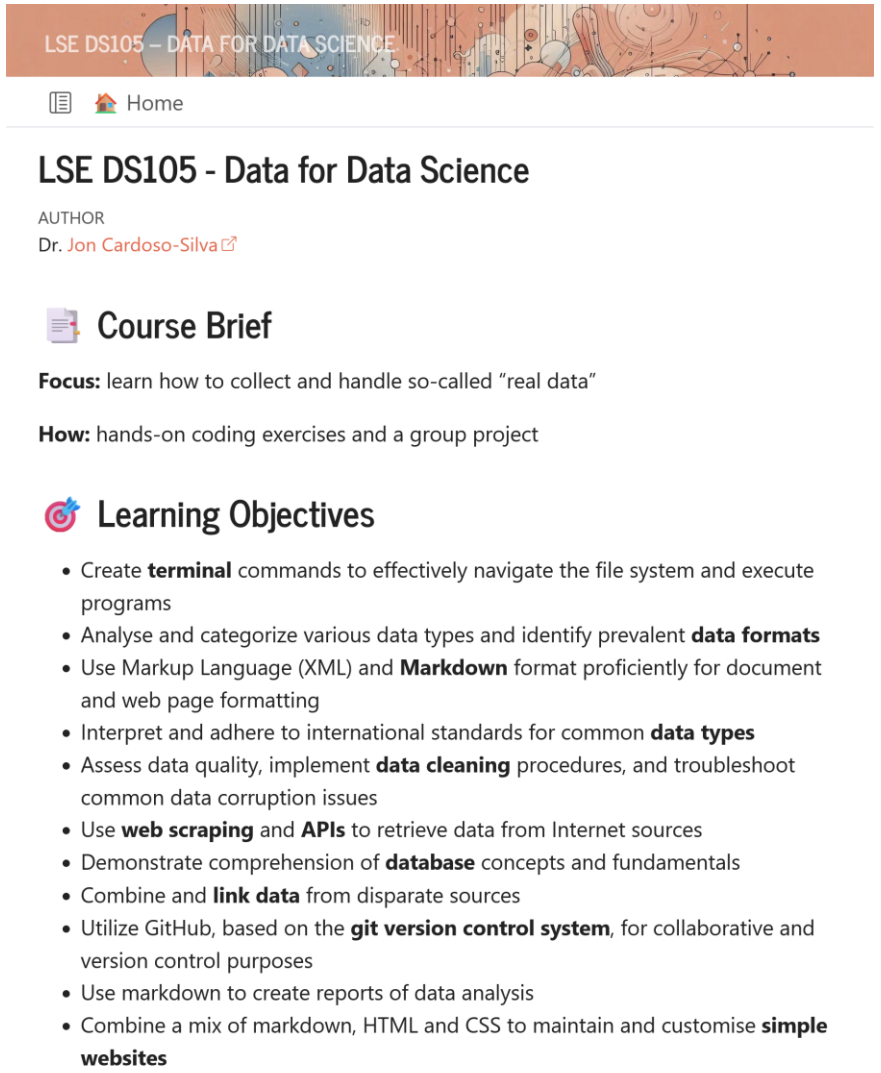
ABOUT DS105W

- Lots of coding 👩‍💻
- Programming (in general, not just for data science) is an iterative process.
  I want students to:

1. Understand the problem
2. Break it into smaller, actionable pieces
3. Figure out how to start
4. Write a first draft
5. Test it out
6. Fix 'bugs'
7. Figure out what is the next step
8. Go back to Step 3



Our observations: DS105 Course



Source: LSE DS105 website (lse-dsi.github.io/DS105)

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Student A	Student B
2nd Year BSc in International Social and Public Policy	2nd Year Bsc in Economics
Took the Python pre-sessional course (but struggled with it)	Had prior experience with Python
Used ChatGPT to help build the solution for their assessment	Used ChatGPT first to review the week's content. **Only then did they use ChatGPT for help with the assessment!**

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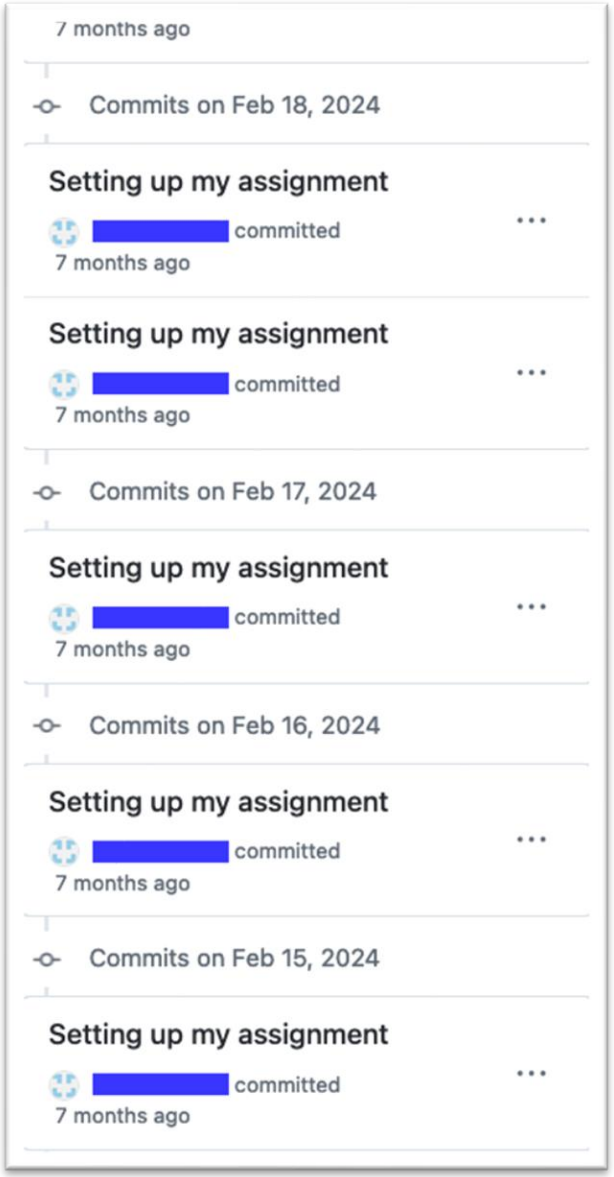
STUDENT A's logs

- All draft updates had the same description 👉

How STUDENT A documented their drafts



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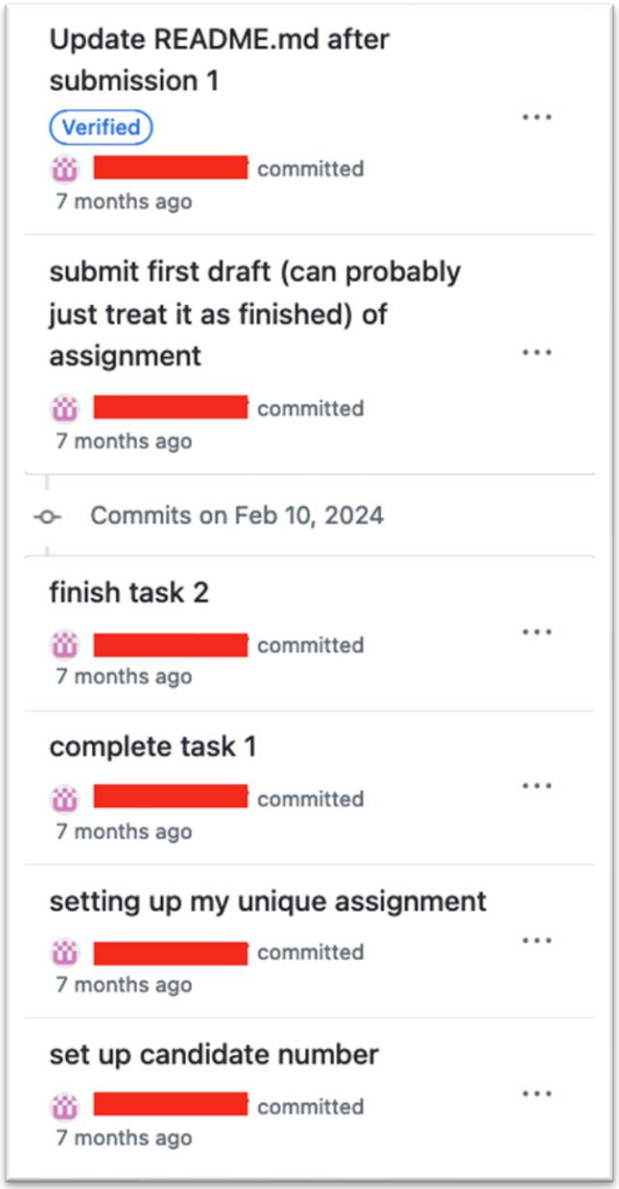
STUDENT B's logs

- Added meaningful descriptions to their logs 👉
- We know exactly what their purpose was with every update.
- This makes it easier to decode their thinking process.

How STUDENT B documented their drafts



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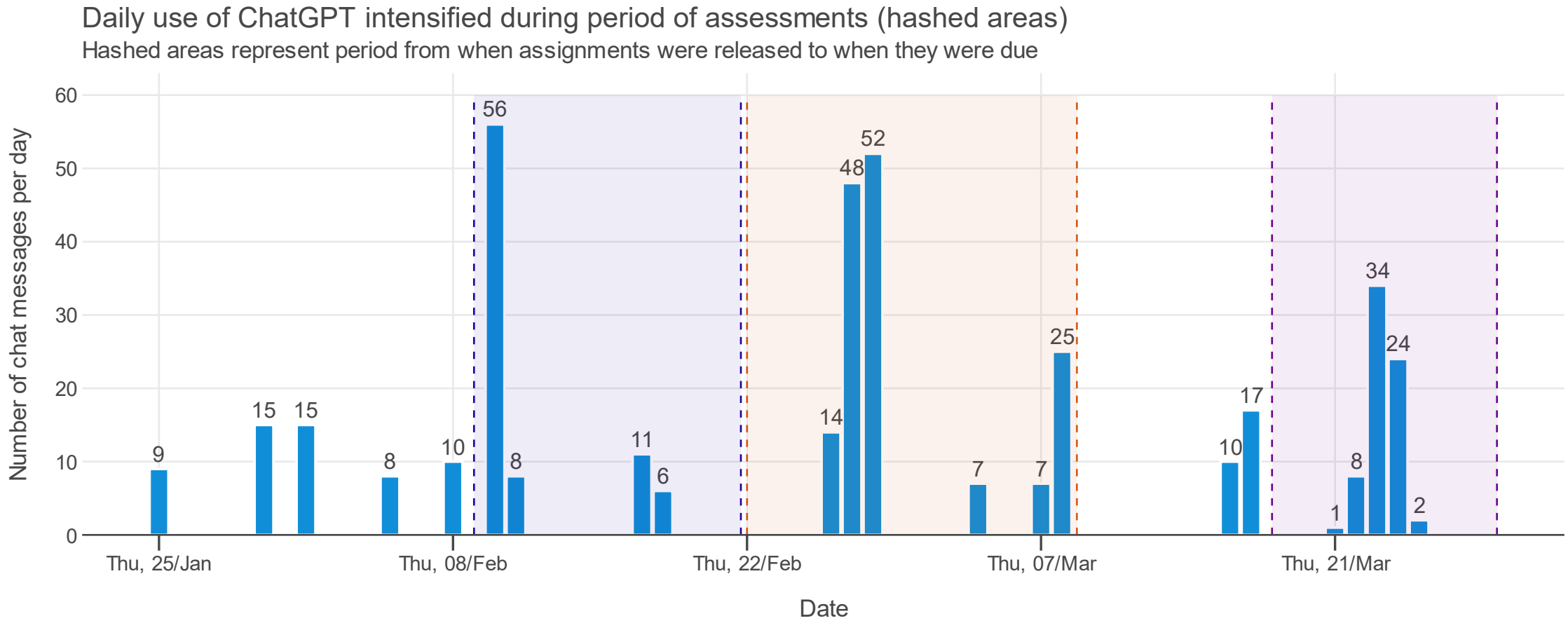
STUDENT B was a resourceful and frequent user of ChatGPT



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STUDENT B challenged the AI !

STUDENT B's logs

- ChatGPT often produced over-complicated stuff
- The student would then go back to my teaching material (🥹), and effectively telling the AI: *"your stuff is not in line with what I learned"*

They were in control of their learning ! !

USER said: (2024-02-10 18:45:07.971380949)

`ok, how do i get that code to output the title of the webpage?`

ASSISTANT:

Comment: Here, ChatGPT's output is a modified version of a complex code it had previously produced, with accompanying commentary. The code it produces will run without any errors, but just as before, it won't return anything because it is in the format of a Python class, not a 'runnable' code like the way we taught in the course.

Importantly, this time, the final sentences in the output clarified that because this is a Python class, this type of code cannot be run as you would any regular script on a Jupyter Notebook. Instead, one would have to create a specific file and run it from the terminal (not how we've been teaching).

It seems unlikely that the student tried that suggestion. A little over 2 minutes later, there is another question:

USER said: (2024-02-10 18:47:27.346262932)

`sel.css('title') worked when the other stuff didn't`

This is very interesting, and it only makes sense in the context of the course! The student provided a piece of code adapted from the teaching material, saying that it worked, whereas the complex code produced by ChatGPT didn't.

ASSISTANT:

From now on, ChatGPT will stop suggesting `Scrapy` classes. Instead, it will use the style of coding suggested by the user, which aligns with the material taught in the course.

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STUDENT A's case is illustrative of the negative aspect of mindless use of GenAI

The task involved writing computer code to:

- ~~Navigate to a page~~
- ~~Grab the entire content of that page~~
- Select just the relevant information
- Clean it up
- Store it

STUDENT A missed two crucial steps. They were misled by an inaccurate use of GenAI, potentially swayed by the chatbot's authoritative tone.

In [546...

```
# URL AND ALT LINKS - ALUMNI
alumni1 = '<img src="/Methodology/Assets/Images/PromoImages/16-9-ratio-Graduations-2012-1010.jpg" alt="16 9 ratio-Graduation
alumnisoup1 = BeautifulSoup(alumni1, 'html.parser')
img_selector1 = 'img'
alumni_tags_1 = alumnisoup1.select(img_selector1)

for img_tag in alumni_tags_1:
    alumni1URL = img_tag.get('src')
    alumni1alt = img_tag.get('alt')

alumni2 = '<img src="/Methodology/Assets/Images/PromoImages/16-9-ratio-Graduations-Dec-1654.jpg" alt="16 9 ratio-Graduations
alumnisoup2 = BeautifulSoup(alumni2, 'html.parser')
alumni_tags2 = alumnisoup2.select(img_selector1)
for img_tag in alumni_tags2:
    alumni2URL = img_tag.get('src')
    alumni2alt = img_tag.get('alt')

alumni3 = '<img src="/Methodology/Assets/Images/PromoImages/LSE-alumni-centre.jpg" alt="LSE alumni centre">'
alumnisoup3 = BeautifulSoup(alumni3, 'html.parser')
alumni_tags3 = alumnisoup3.select(img_selector1)
for img_tag in alumni_tags3:
    alumni3URL = img_tag.get('src')
    alumni3alt = img_tag.get('alt')
```

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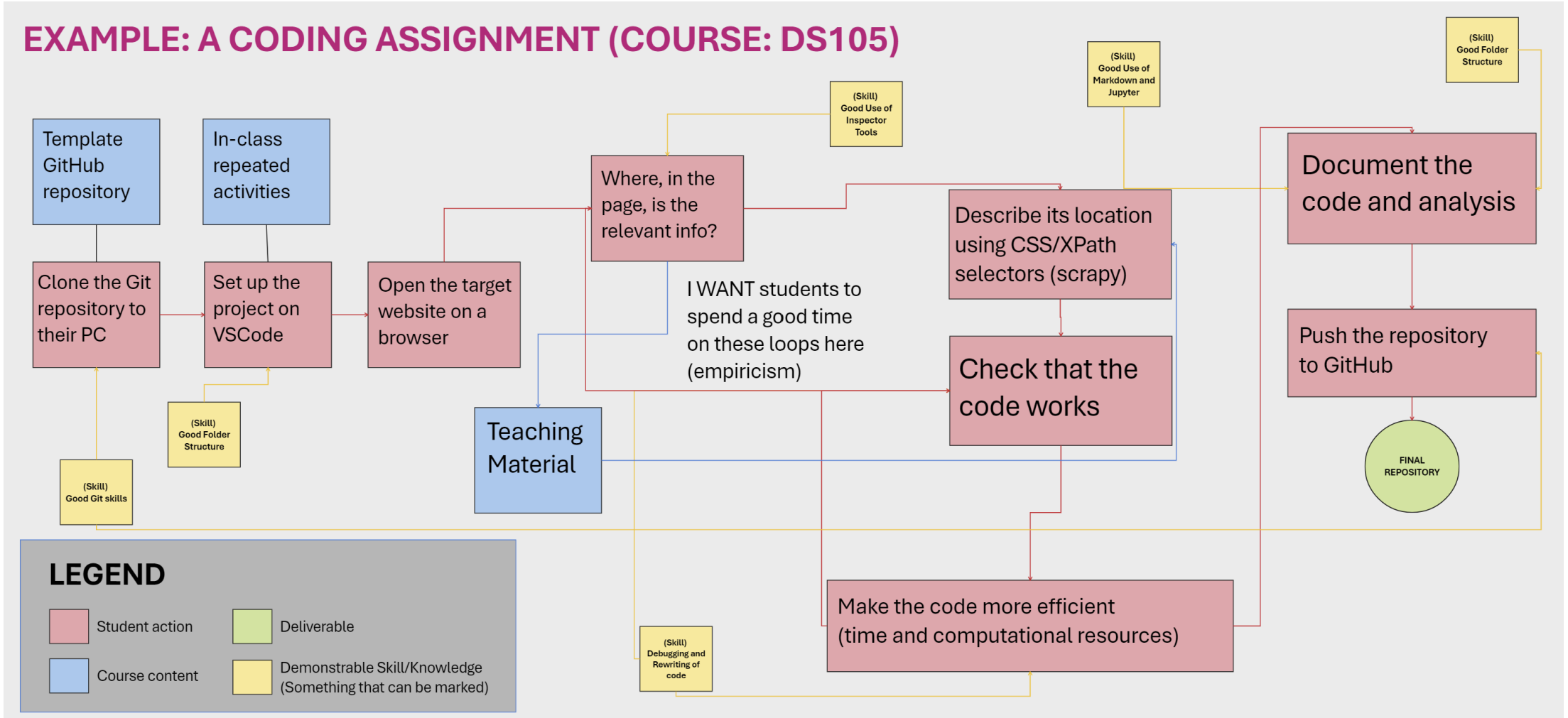
A potential solution: mapping the entire process & identifying: where can GenAI hijack?



Learn more about our project and get in touch:

Approach Generative AI Tools Proactively or Risk Bypassing the Learning Process in Higher Education

Dorottya Sallai[1,*], **Jonathan Cardoso-Silva**[2,*], **Marcos E. Barreto**[3,*], **Francesca Panero**[3], **Ghita Berrada**[2], and **Sara Luxmoore**[2].

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Forthcoming in LSE Public Policy Review, 2024

Abstract

The growing reliance of higher education (HE) students on Generative Artificial Intelligence (GenAI) tools for learning and assessment risks circumventing rather than enhancing the learning process if no adequate support and direction are provided. Reflecting on experience from a UK university, our article explores how students use GenAI tools in practice. We argue that students rely on GenAI differently for learning than for assessments and tend to focus more on the output or performance than the learning journey itself. This raises questions on how GenAI can be successfully integrated into the curriculum without jeopardising learning. Based on our observations that some students use GenAI platforms as a substitute for learning rather than as a tool to enhance learning, our policy recommendations focus on curriculum planning and assessment design.

Paper accepted for the special edition of LSE Public Policy Review out this November 2024
(**preprint available**)

We will also publish a complete account of the study soon!

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