Let's Talk It Out: A Chatbot for Effective Study Habit Behavioral Change

Xiaoyi Tian*, Zak Risha, Ishrat Ahmed,

Arun Balajiee Lekshmi Narayanan, Jacob Biehl

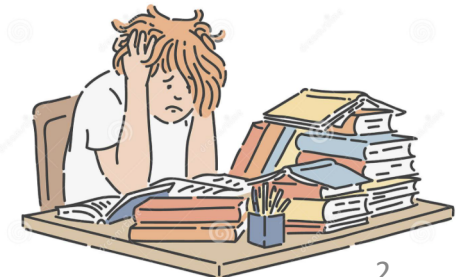CSCW 2021

University of Florida*

University of Pittsburgh

Introduction

First-year college experience can be very challenging

- Transition to new environment

- Inadequate study habits and skills (Chamundeswari, 2014)

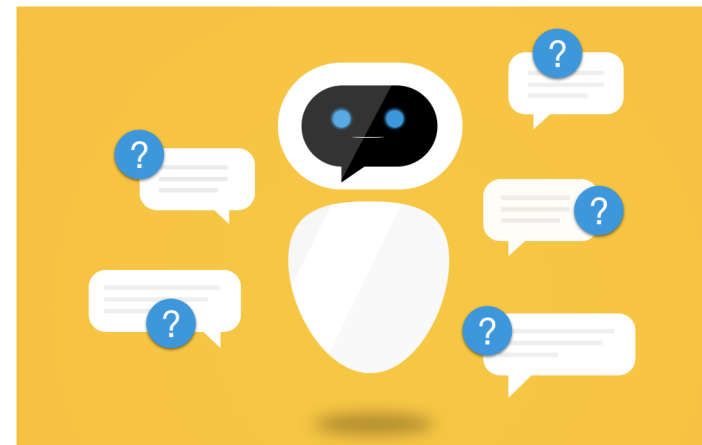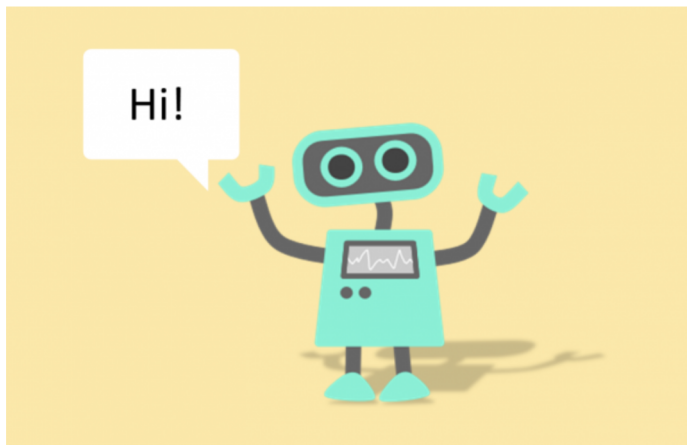- High attrition rates, particularly in Computer Science (CS)

Remote learning environments under COVID-19
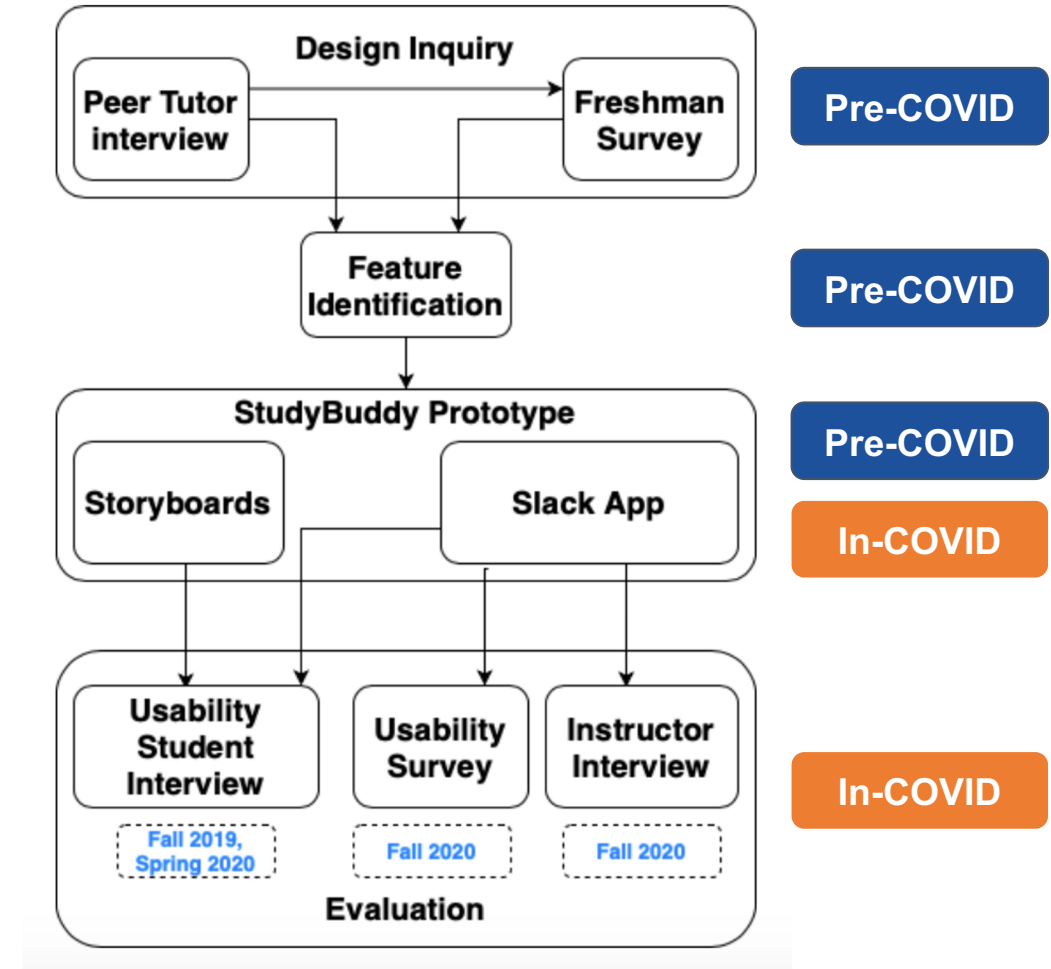
- More supports are needed

Chatbots as persuasive technology may help

- Aim to change everyday behavior
    - Journaling food (Lukof et al, 2017)
    - Self-reflection at work (Williams et al, 2018)
- Our goal: Design a chatbot for study behavioral change

Outline

- Design inquiry

- *StudyBuddy* features and prototypes

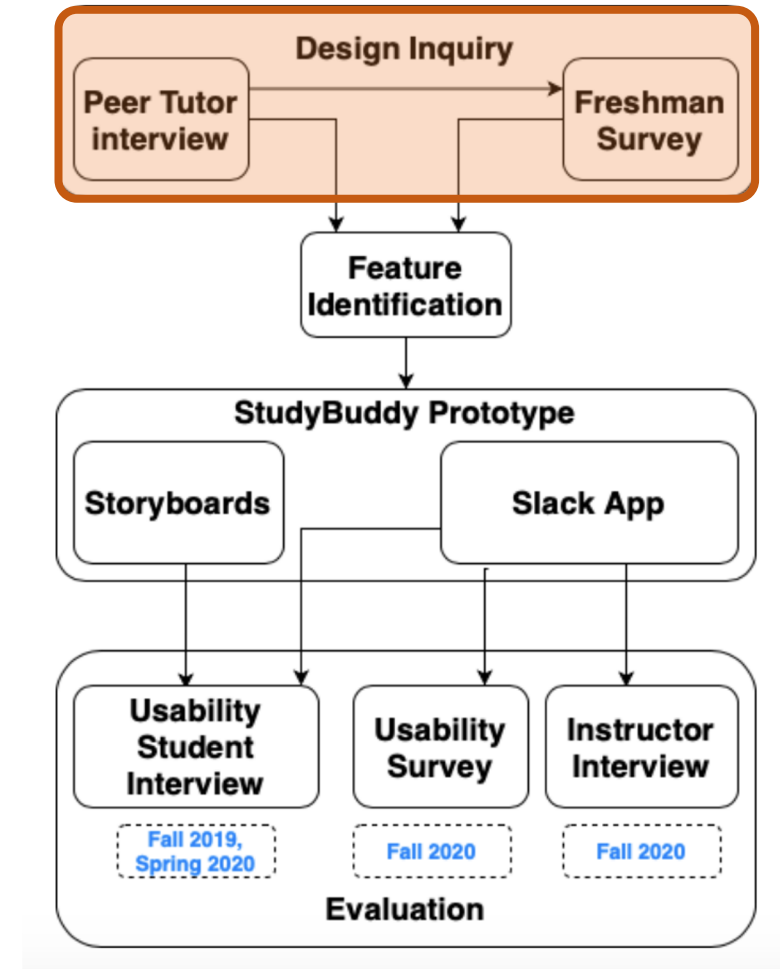- Evaluation and design recommendation

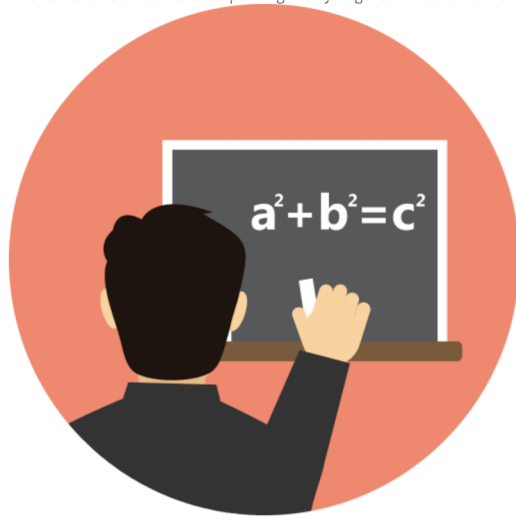- Conclusion

Design Flowchart

Outline

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- *StudyBuddy* features and prototypes

- Evaluation and design recommendation

- Conclusion

Design Flowchart

Design Inquiry

Peer-tutor interview

3 CS peer tutors

In-class Survey

83 students

(94% freshman)

Design Inquiry Findings

- Common challenges first-year students are facing

Time management
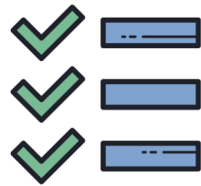
Task management
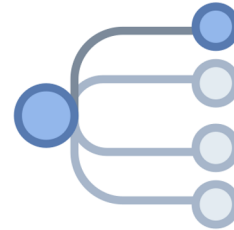
Lack of domain knowledge

Unfamiliar with academic resources

- Expressed interest in using chatbot for study behaviors
- Perceived useful of chatbot features

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Design Flowchart

StudyBuddy Features

Insider tips

Reminders

connecting
to a tutor

Study habit
feedback

Task
breaking-down

recommending
academic resources

StudyBuddy Prototypes

Insider tips

Reminders

Study habit feedback

Task breaking-down

Slack App

StudyBuddy ☆

Messages   About

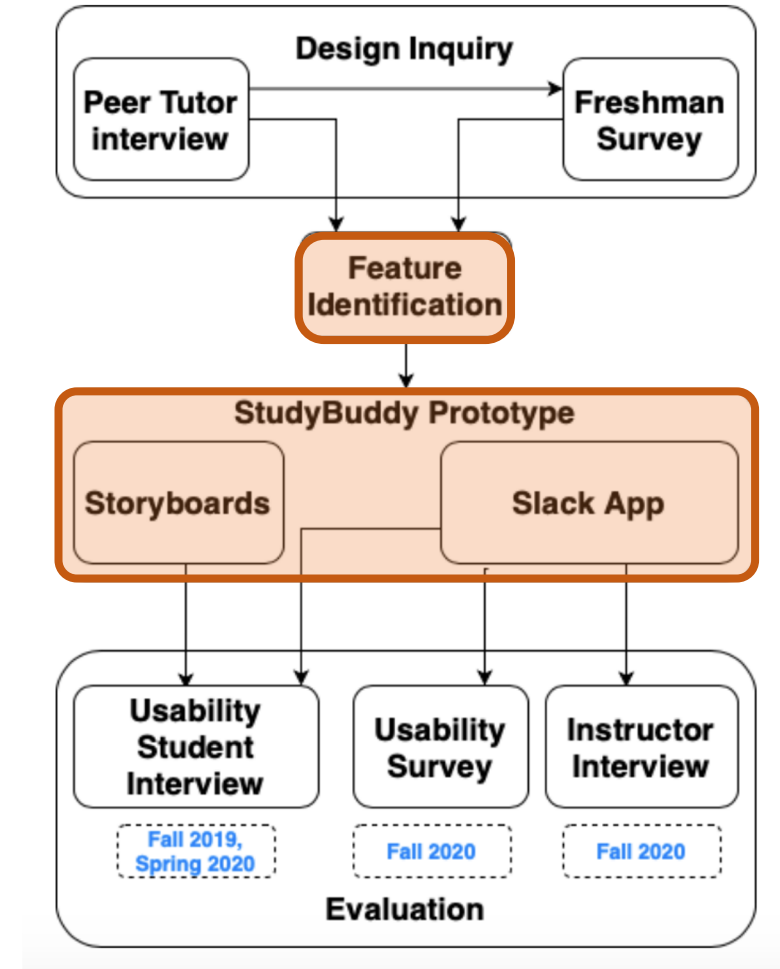**Study Buddy** APP 12:   May 31st, 2020 ⌄
Awesome! Our next step is implementing you pseudo code using IDE.
Have you done it yet?

Freshman User 12:39 PM
no

Study Buddy APP 12:39 PM
Okay. Let's try to implement your pseudo code. Have the JDK
installed on your machine (duh!). Then open the IDE and start
programming. Don't forget to do unit testing as you're programming!

Freshman User 12:40 PM

Message StudyBuddy

StudyBuddy Prototypes

Insider tips

Study habit feedback

Task breaking-down

🤖 : If you're stuck with something, try visualizing, pen and paper! *(functional tip)*

Slack App

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Message StudyBuddy

11

StudyBuddy Prototypes

Insider tips

Study habit feedback

Task breaking-down

Slack App

🤖 : If you're stuck with something, try visualizing, pen and paper! *(functional tip)*

🤖 : It's okay to take a break. *(motivational tip)*

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Message StudyBuddy

StudyBuddy Prototypes: Storyboards
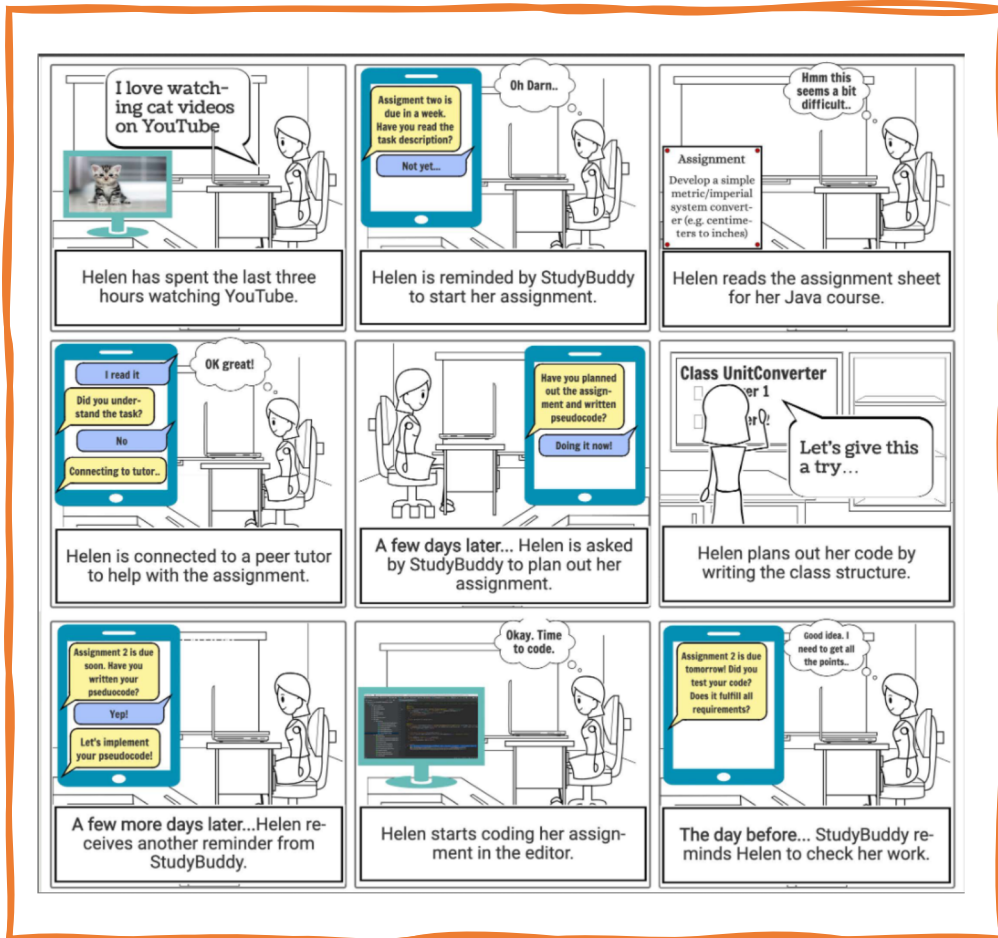
connecting
to a tutor

recommending
academic resources
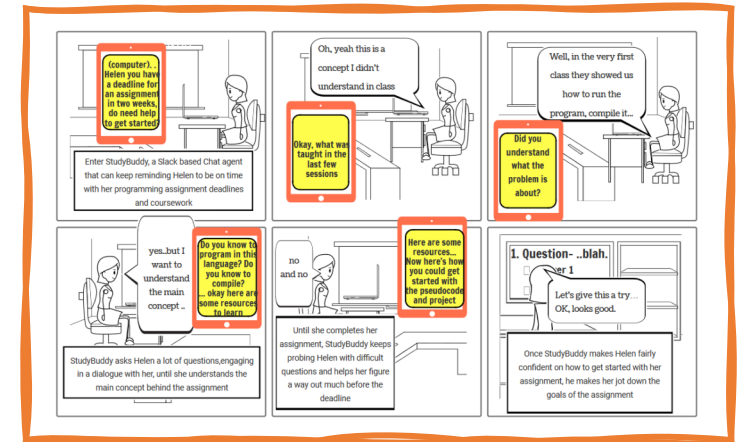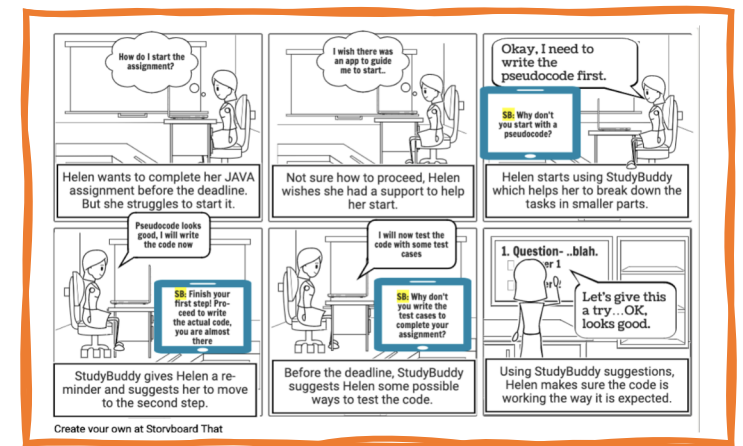
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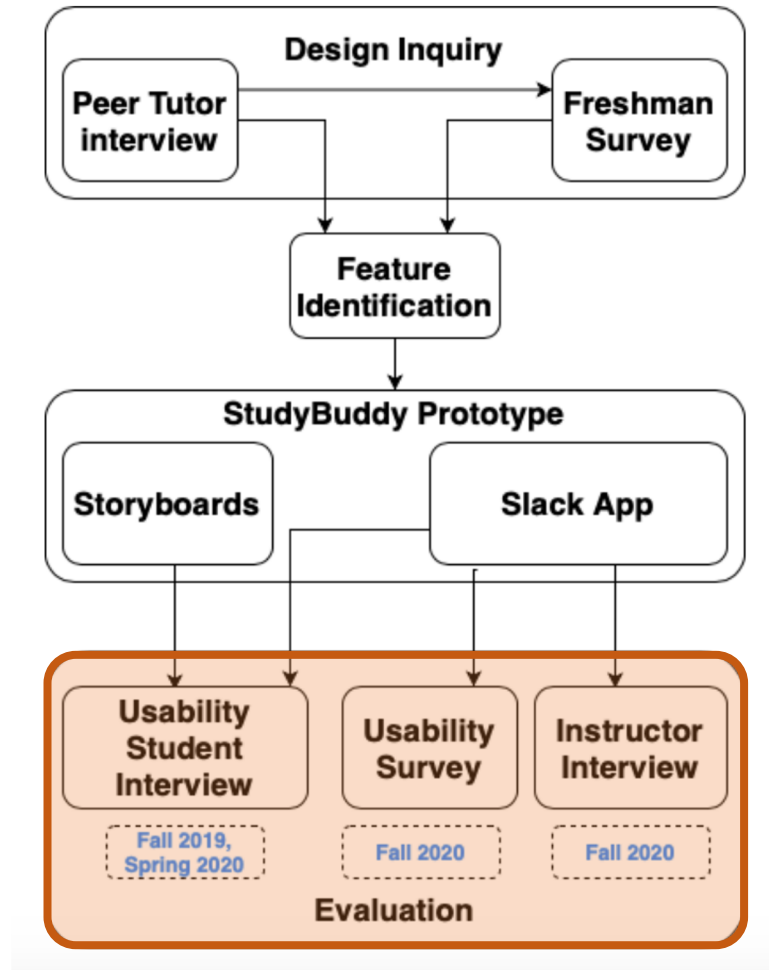
Design Flowchart

Evaluation

Student Interview	Usability Survey	Instructor Interview
8 students first-year and senior students	117 students All year groups of undergrads	5 CS course instructors

Design recommendations

- Building Trust with Users

- Personalizing the Chatbot Experience

- Gender and Individual Differences

- Immediate Help vs. Long-term Sustainable Support

- Design for a Context-Aware Chatbot

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Student interview findings

- Variations of perception of different tips among individuals

Overall ranking	Category	Tip content	Ranking by each participant (The darker indicates higher rank)							
			f1	f2	f3	f4	s1	s2	s3	s4
1	Functional	If you're stuck with something, try visualizing, pen and paper!	1	1	6	3	2	1	3	1
2		Before you write the program, try to visualize the entire idea in your mind, come up with the main cases, write the algorithm, have a pseudo code. Then, your programming will be faster and have less bugs.	2	3	1	2	3	2	6	2
3		Always write code in incrementally functional bits.	5	2	3	4	9	6	4	6
5		It is always a good idea to write functions in your program	6	7	5	5	6	4	5	5
6		To debug a program you can place print statements (a quick and dirty way).	8	6	7	1	7	3	8	4
9		The debugger is your friend.	7	5	8	7	8	9	7	3
10		Algorithms is what makes us separate from others, try to be good at them!	9	8	9	6	10	8	9	7
4	Motivational	If you're studying late in the night, make sure to get some sleep before the test.	4	4	10	8	1	5	1	9
7		....it's okay to take a break.	10	10	2	9	4	7	2	8
8		When the going gets tough, the tough gets going!	3	9	4	10	5	10	10	2
11		Coffee is your second friend.	11	11	11	11	11	11	11	10

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Functional

In CS, you can ONLY achieve motivation if you succeed in a project.
- Senior student 2

20

Student interview findings

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11		Coffee is your second friend.	11	11	11	11	11	11	11	10

Functional

Motivational

> In CS, you can ONLY achieve motivation if you succeed in a project.
> *- Senior student 2*

> I will feel closer to the bot if it has a fun personality.
> *- Senior student 4*

Student interview findings

Design Lesson Learned 1:

Personalizing the chatbot experience

Student usability survey

- Unified Theory of Acceptance and Use of Technology (UTAUT)

Self Management of Learning	Trust
Effort Expectancy	Performance Expectancy
Satisfaction	Behavioral Intention

High Behavioral Intention

Student usability survey

- Unified Theory of Acceptance and Use of Technology (UTAUT)

Self Management of Learning	Trust
Effort Expectancy	Performance Expectancy
Satisfaction	Behavioral Intention

Female higher than male
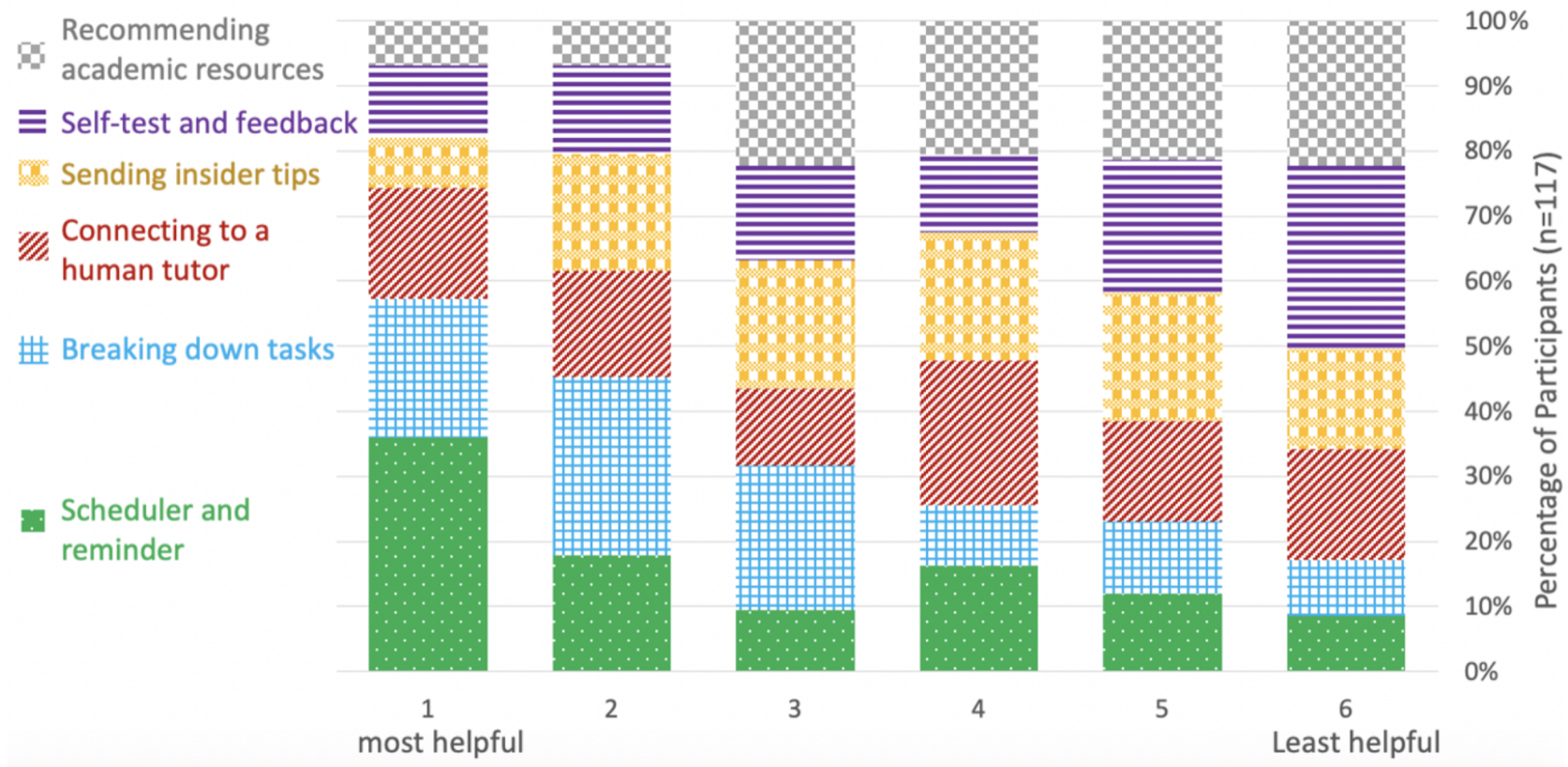
Student usability survey

- UTAUT

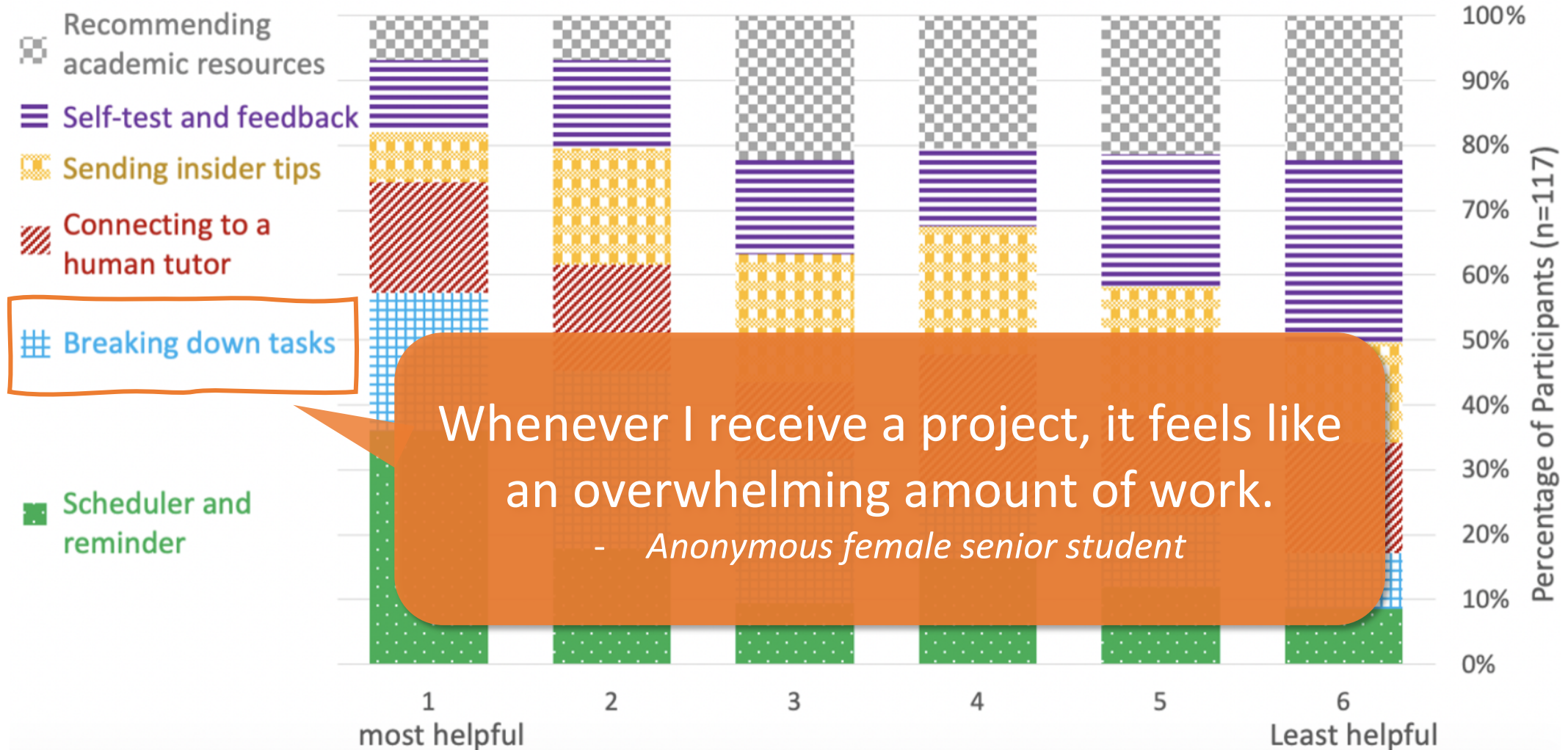**Design lesson learned 2**

Gender and individual differences

Student usability survey

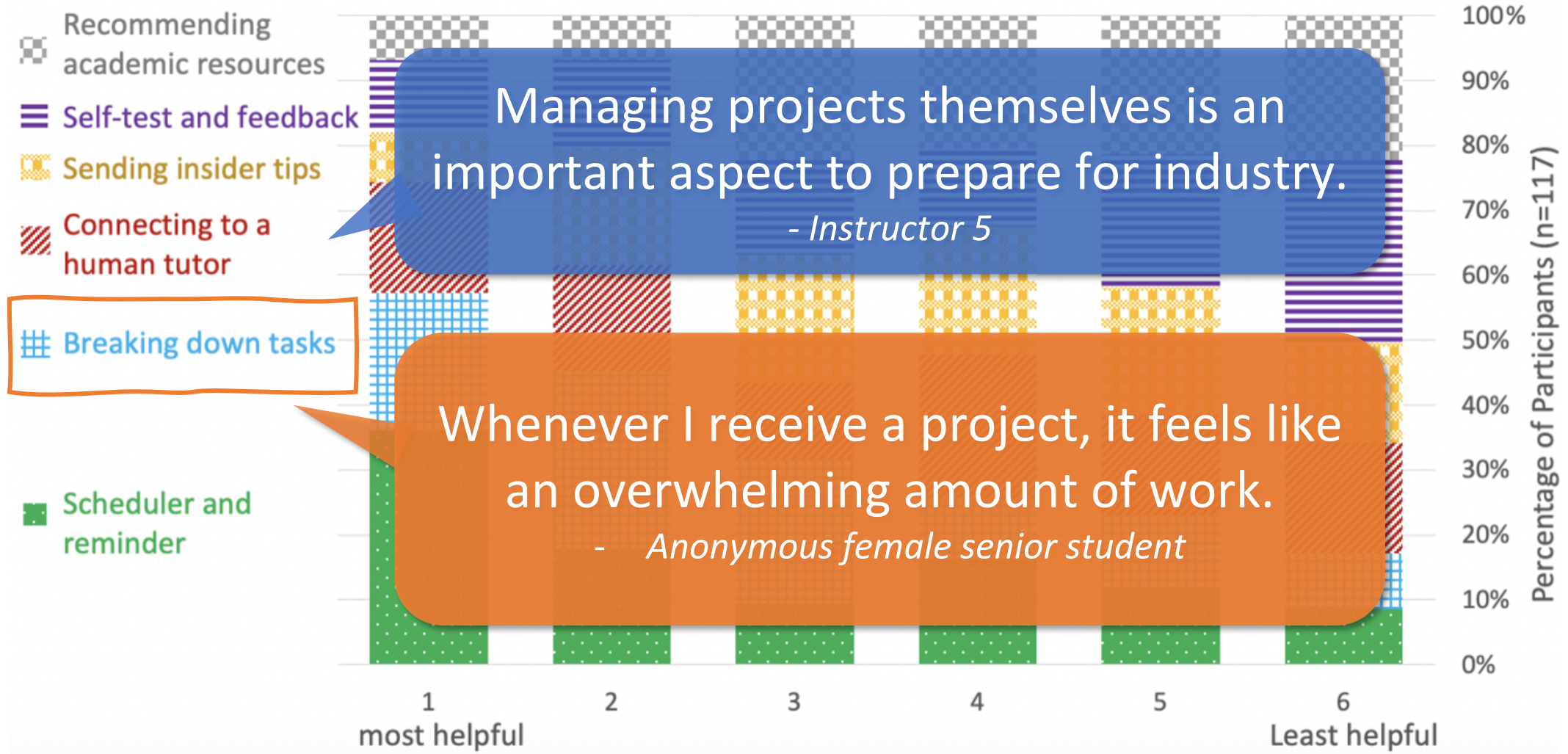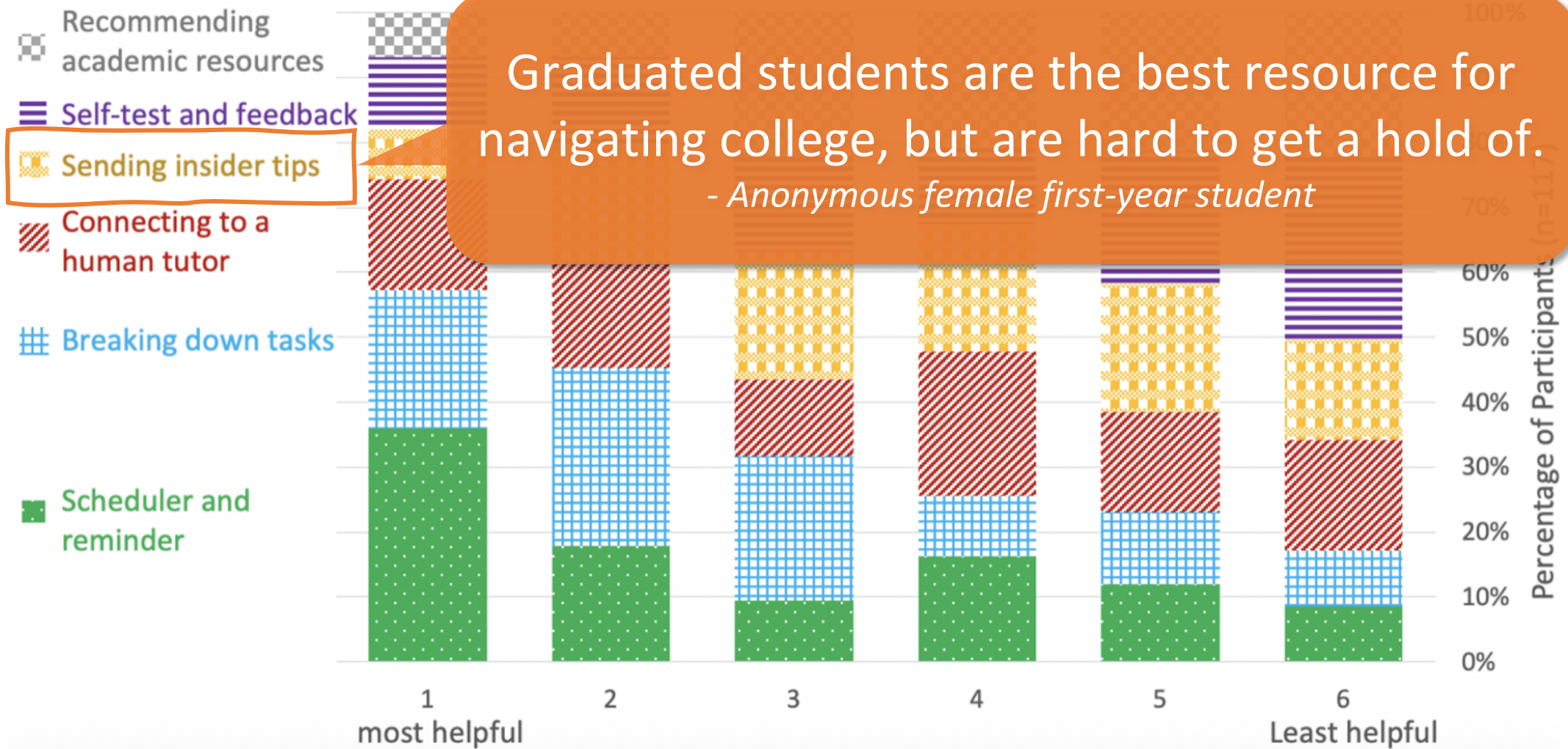- Student ranking of designed features

Feature Perception: instructors vs. students

Feature Perception: instructors vs. students

Feature Perception: instructors vs. students

Legend:
- Recommending academic resources
- Self-test and feedback
- Sending insider tips
- Connecting to a human tutor
- Breaking down tasks
- Scheduler and reminder

X-axis: 1 most helpful, 2, 3, 4, 5, 6 Least helpful

Y-axis: Percentage of Participants (n=117), 0% to 100%

> Graduated students are the best resource for navigating college, but are hard to get a hold of.
> *- Anonymous female first-year student*

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Graduated students are the best resource for navigating college, but are hard to get a hold of.
- Anonymous female first-year student

It could be used in a negative way. Teachers don't change course content, it's easy to cheat.
- Instructor 1

X-axis: 1 most helpful, 2, 3, 4, 5, 6 Least helpful

Y-axis: Percentage of Participants (n=117): 0% 10% 20% 30% 40% 50% 60% 70% 100%
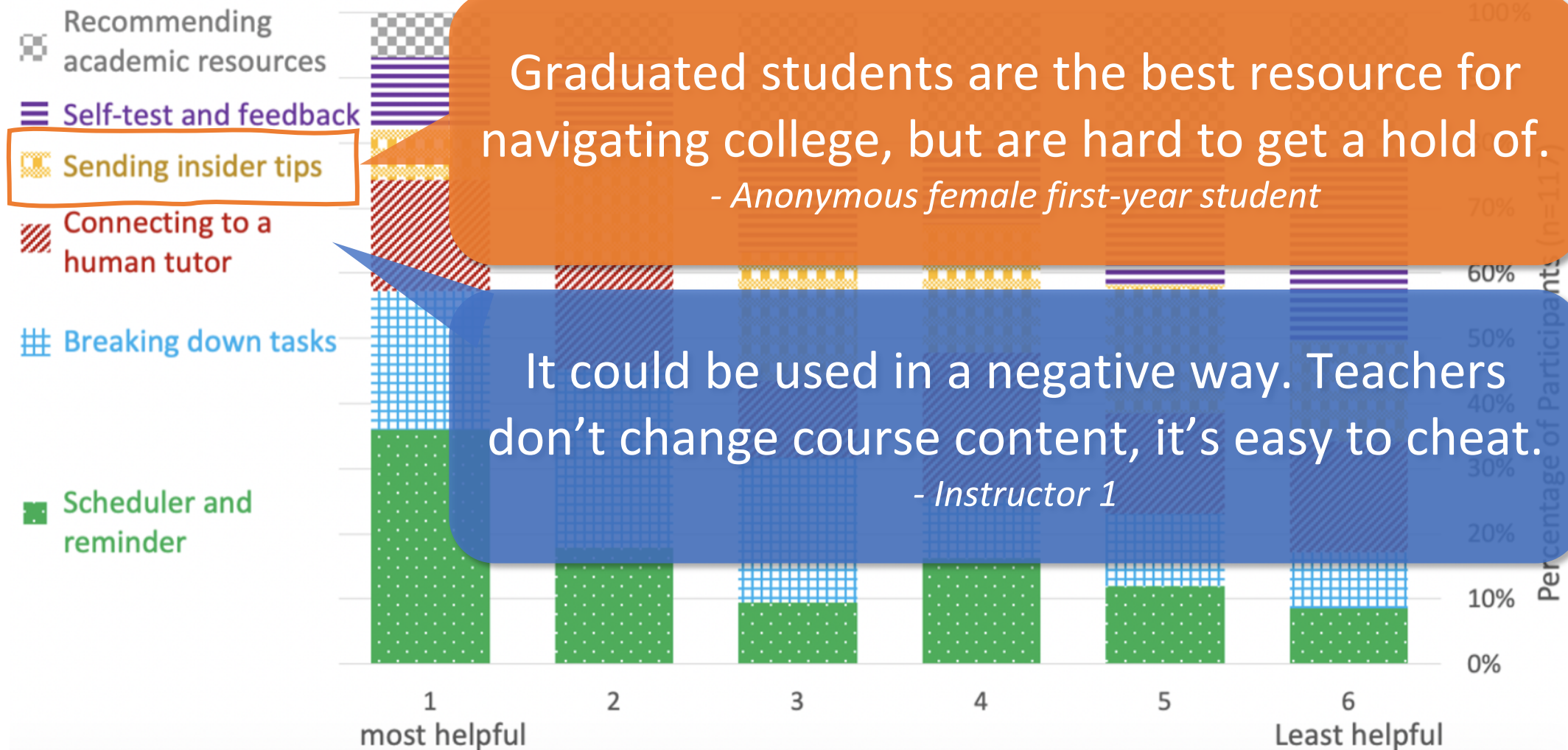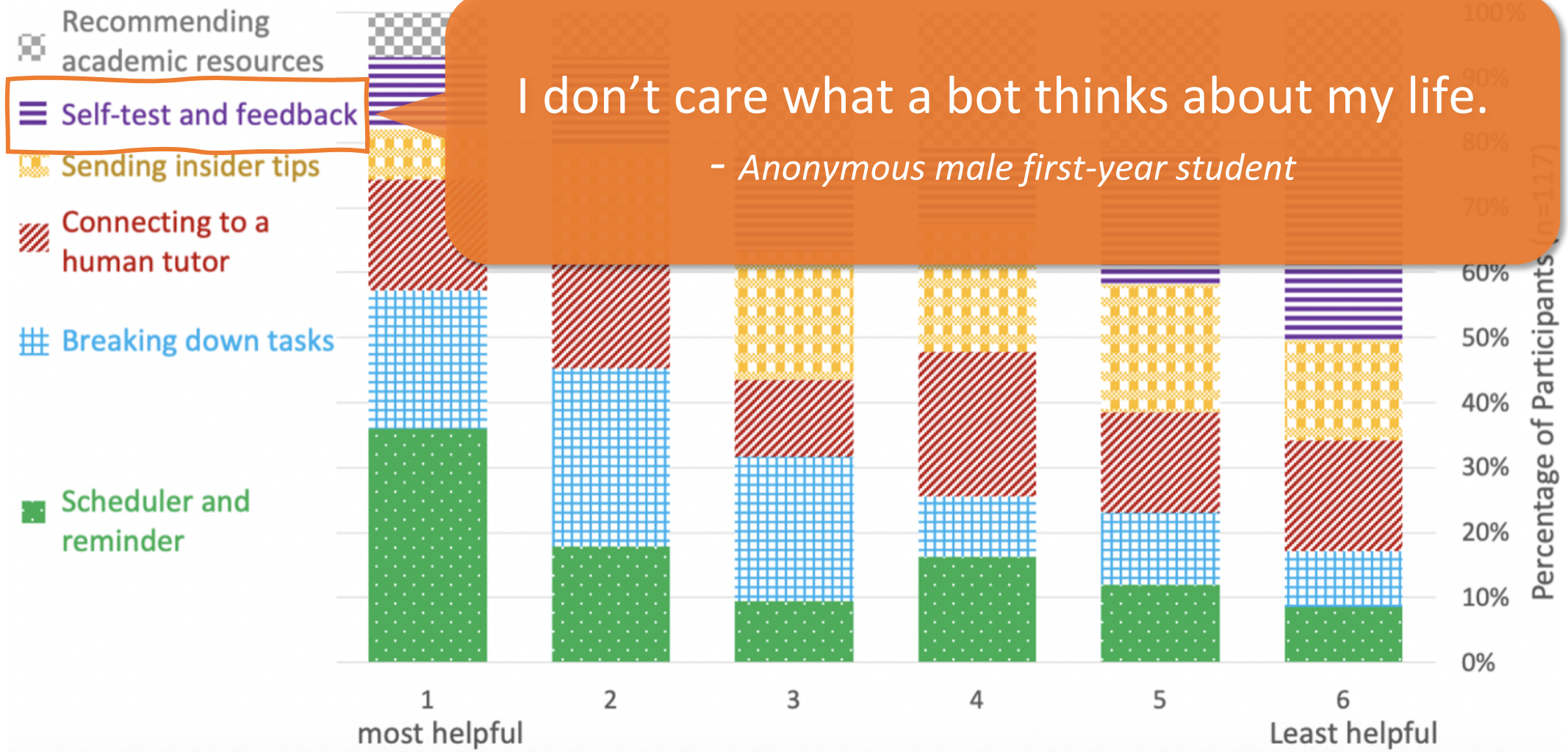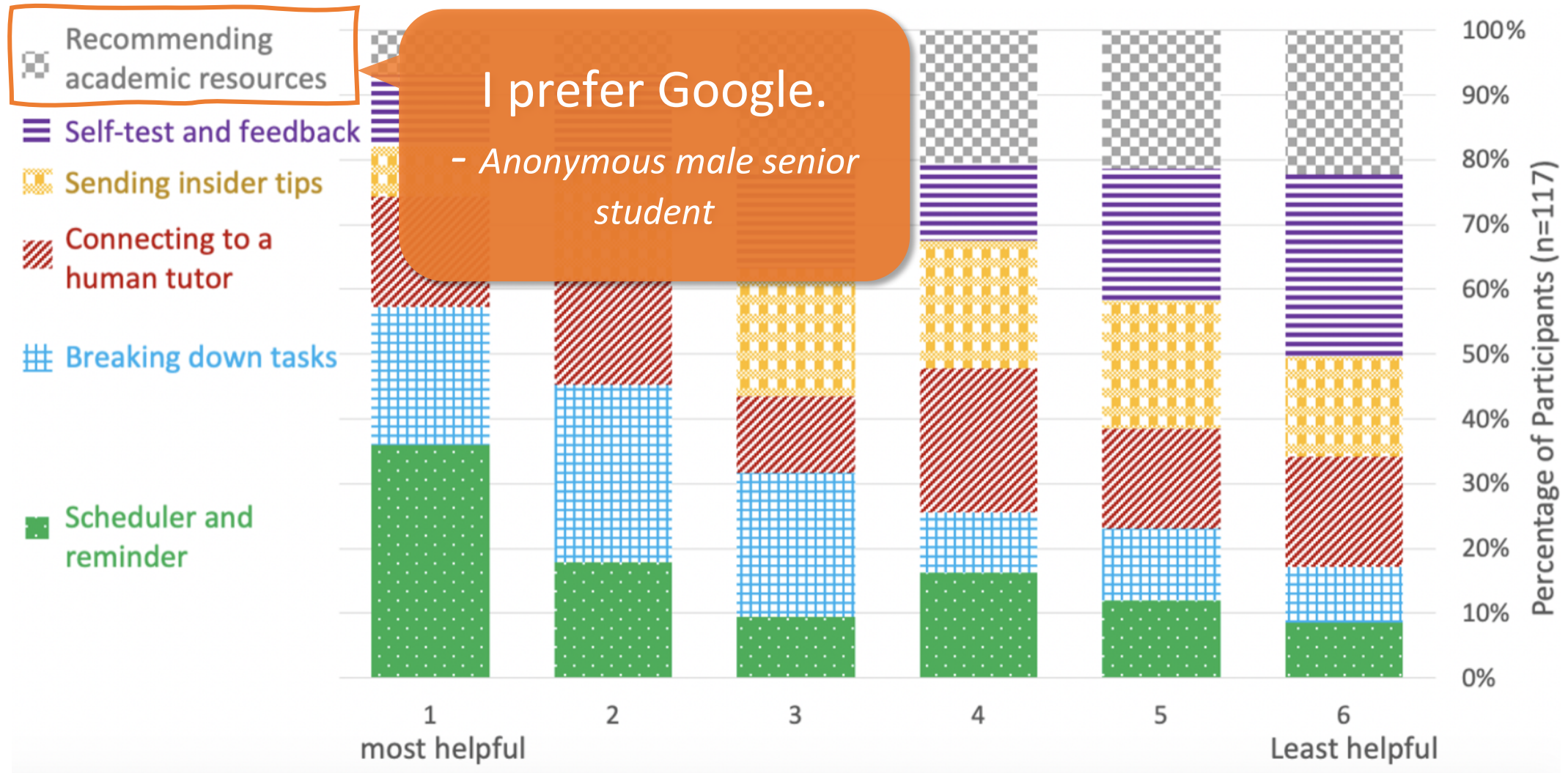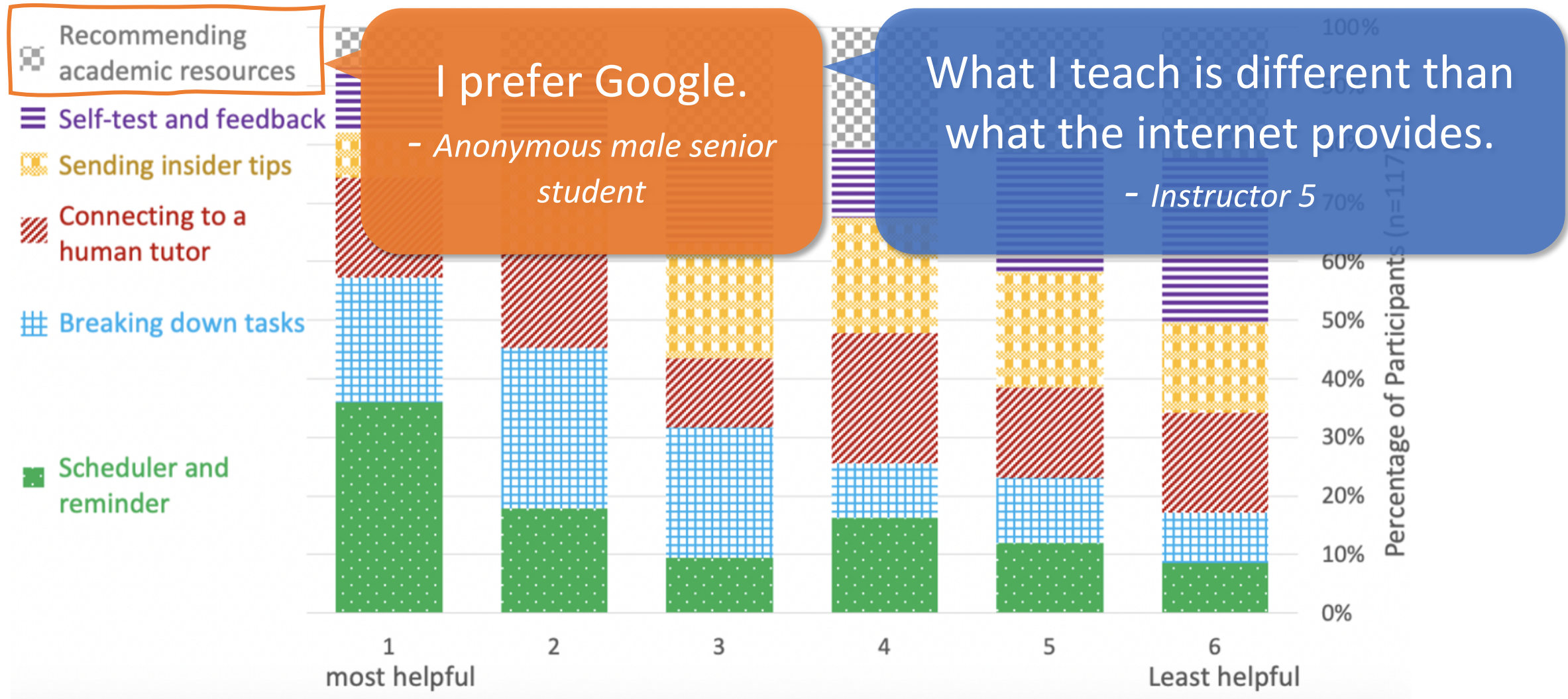
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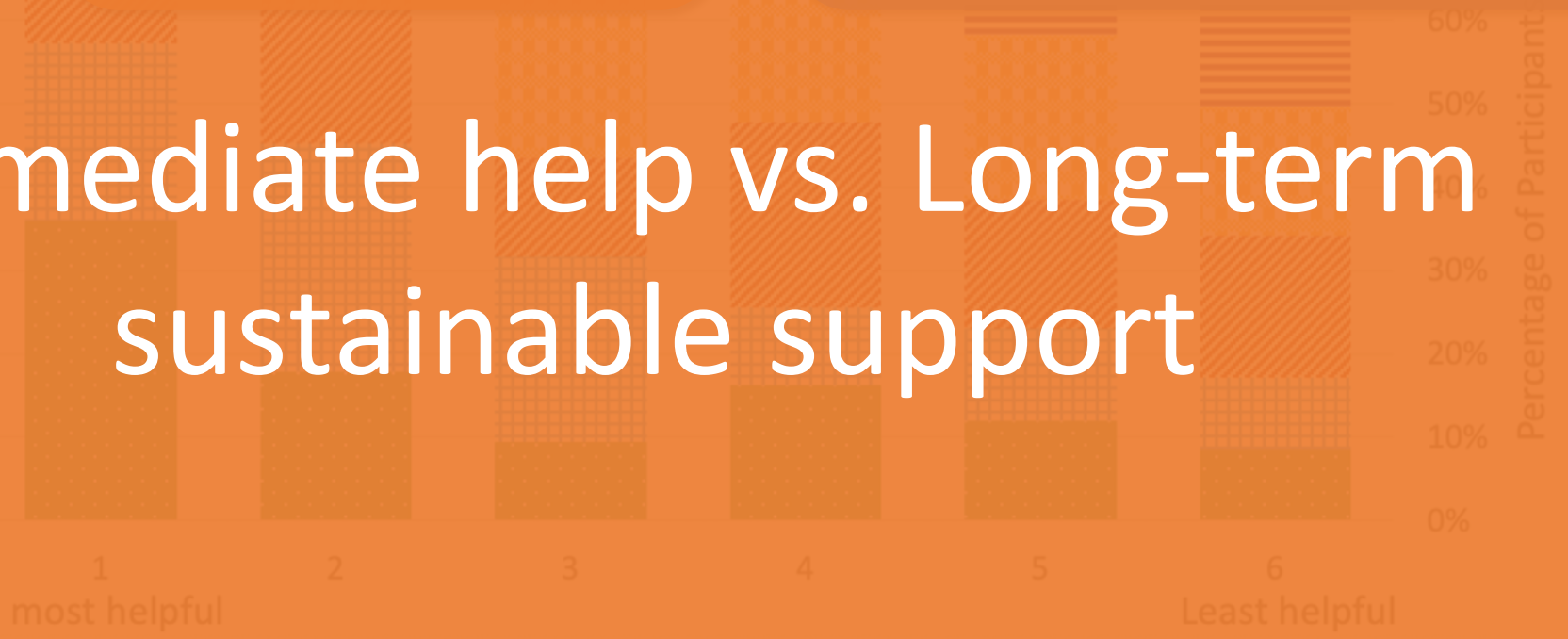
Feature Perception: instructors vs. students

Design Lesson Learned 3

Immediate help vs. Long-term sustainable support

Future work

- Long-term adaptation

- Early detection of students in higher risks

- Department decision-making

  - Curriculum formation

  - Teaching resource allocation

- Support distance education

Key Takeaways

- Our prototype of a chatbot to improve study habits was perceived useful by students, though was influenced by factors like gender and individual experiences.

- In designing a chatbot for behavioral change, we need to **personalize the experience** based on the user and context.

- To ensure continued use, a chatbot should balance between offering **immediate help** and **long-term sustainable support**.

Thanks

Authors

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Contact

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