

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

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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)

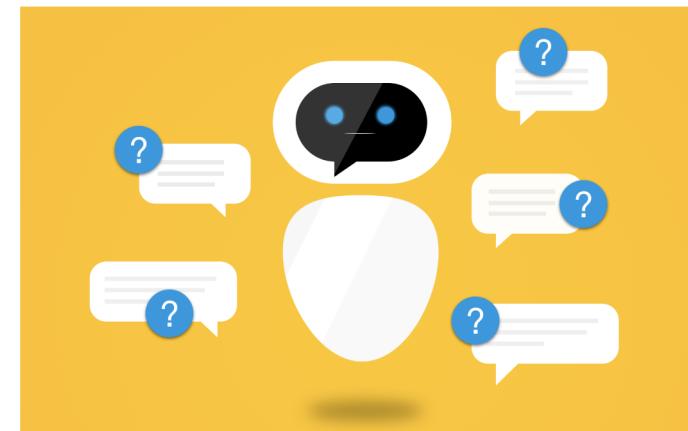
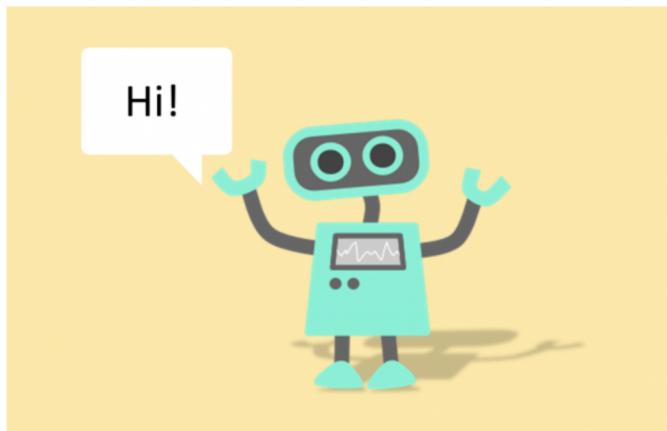
Remote learning environments under COVID-19

- More supports are needed



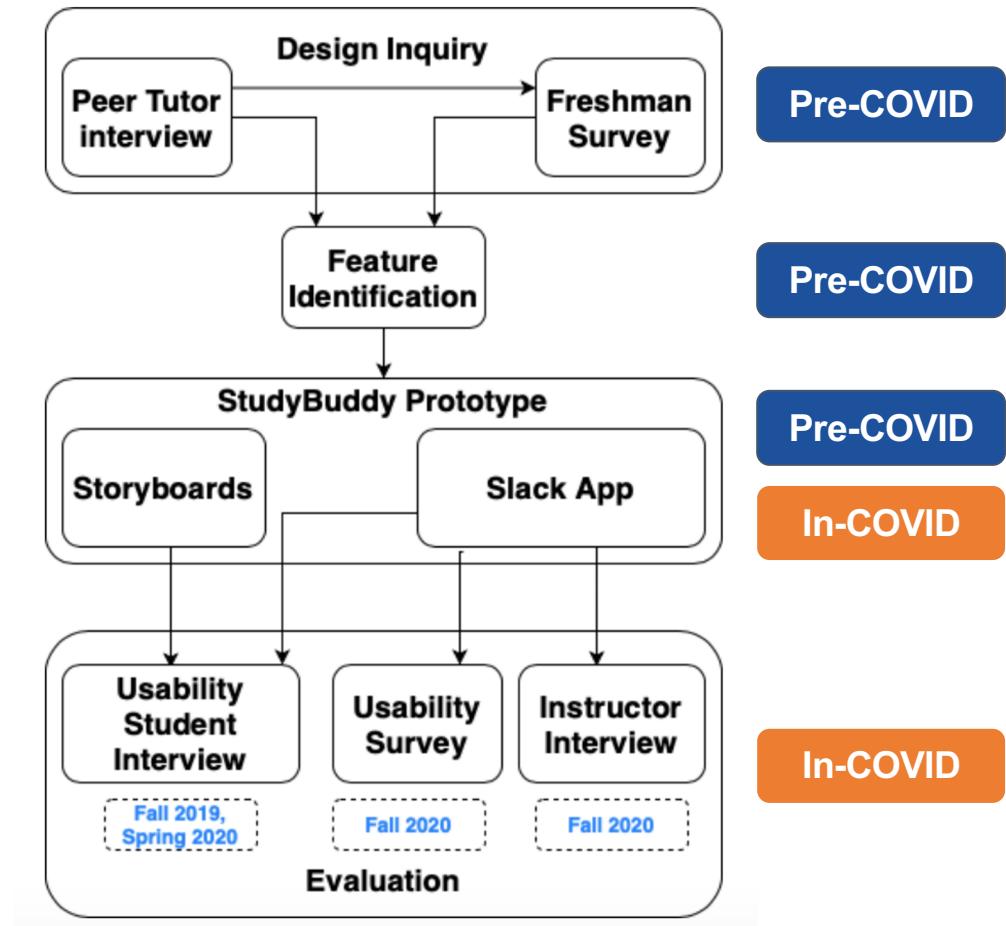
Chatbots as persuasive technology may help

- 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

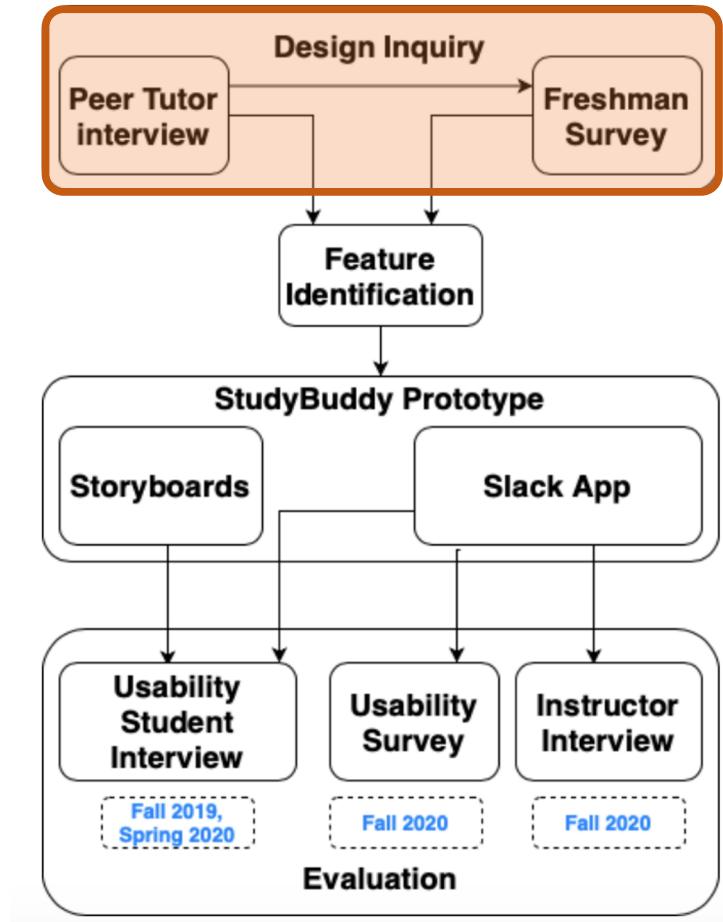
- Design inquiry
- *StudyBuddy* features and prototypes
- Evaluation and design recommendation
- Conclusion



Design Flowchart

Outline

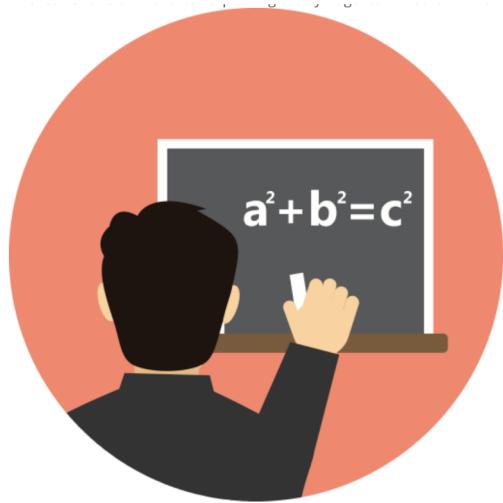
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Design Flowchart



Design Inquiry



Peer-tutor interview
3 CS peer tutors



In-class Survey
83 students
(94% freshman)

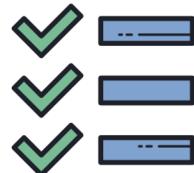


Design Inquiry Findings

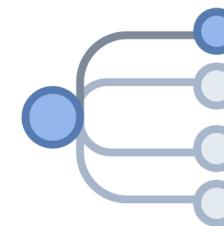
- Common challenges first-year students are facing



Time management



Task management



Lack of domain knowledge

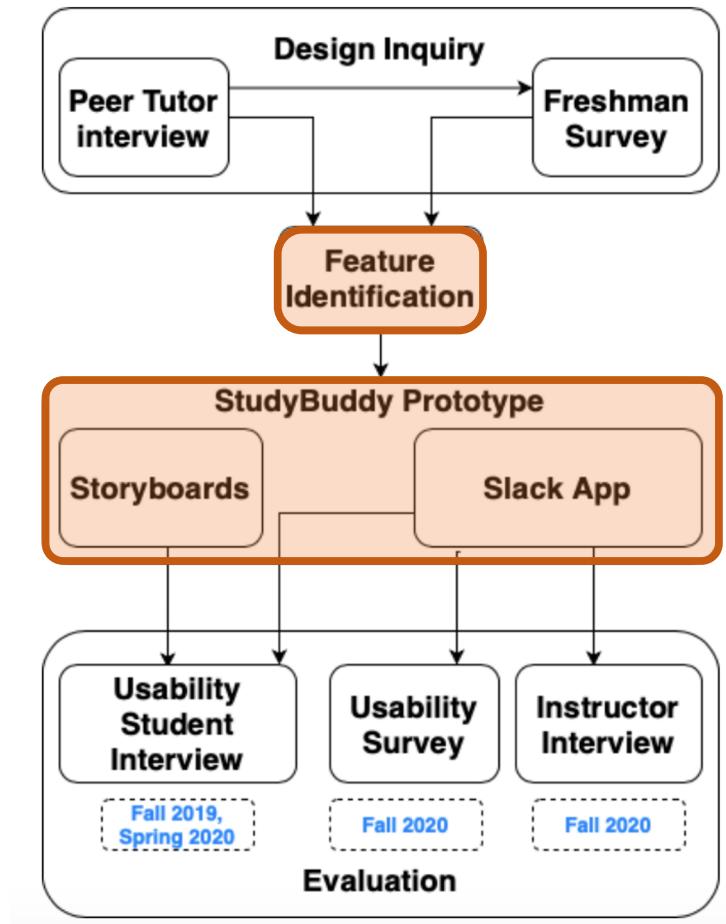


Unfamiliar with academic resources

- 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



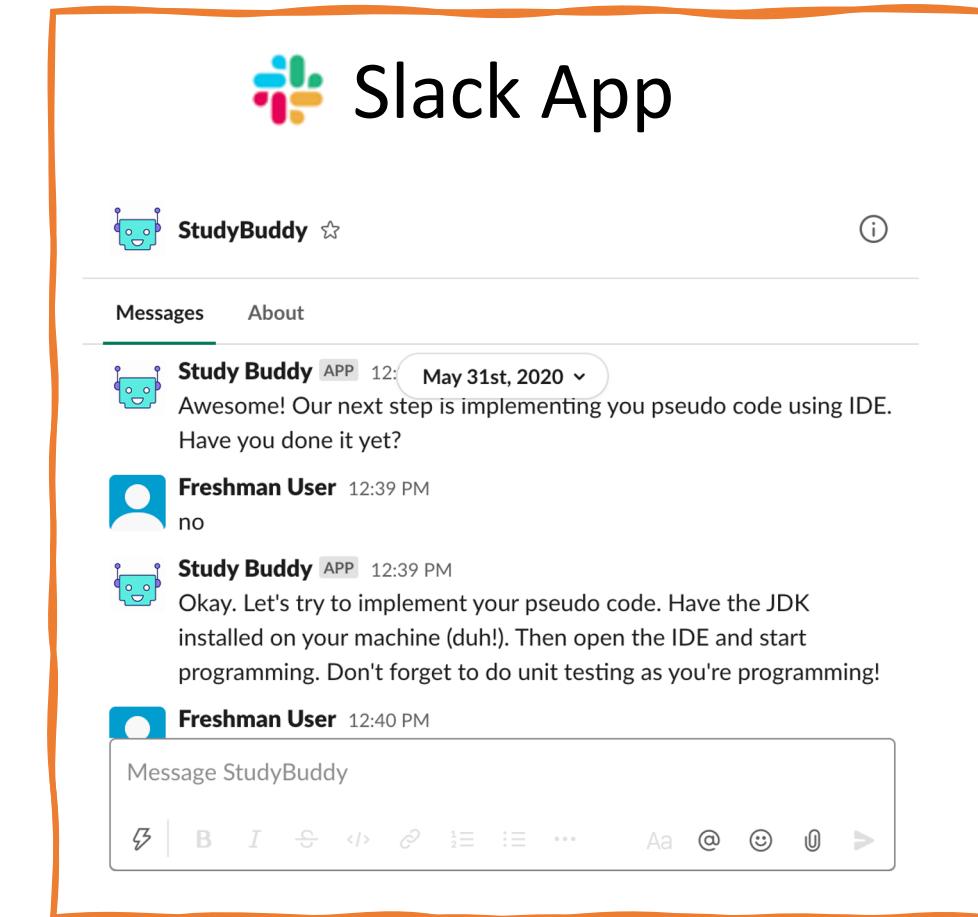
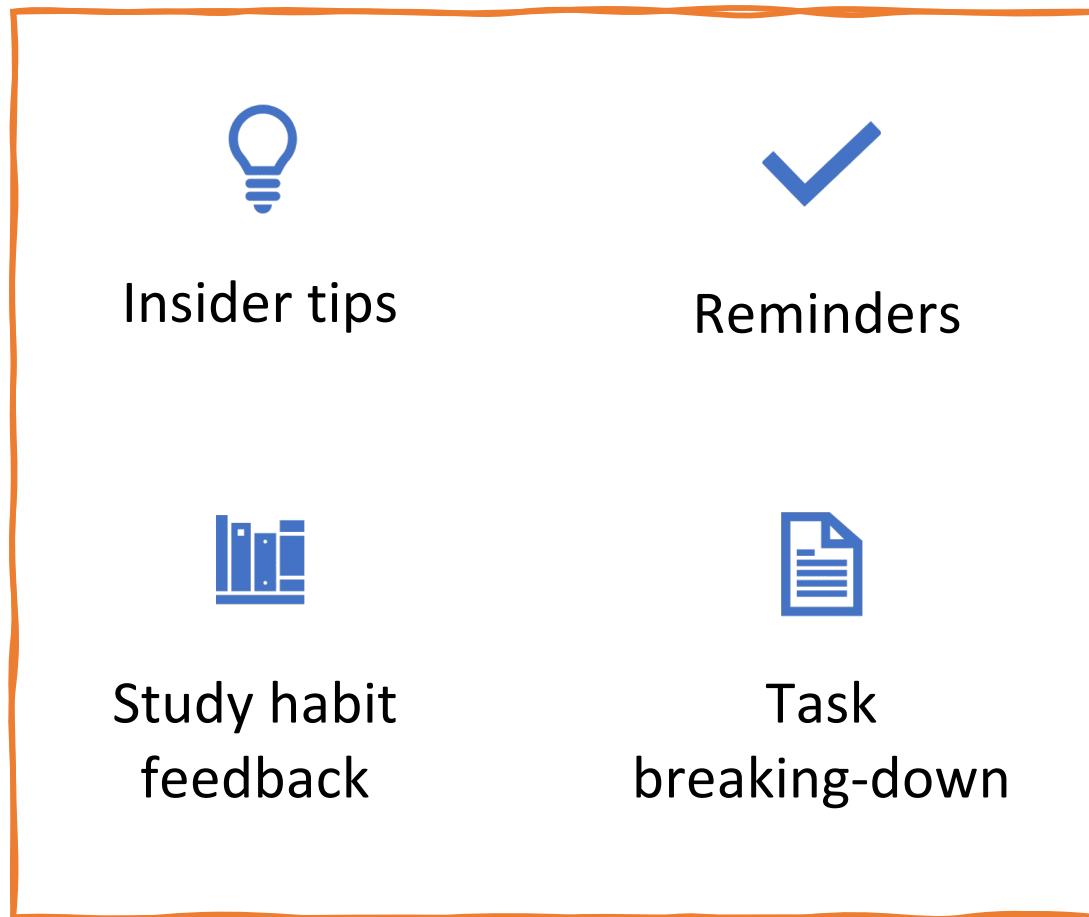
Task
breaking-down



recommending
academic resources



StudyBuddy Prototypes





StudyBuddy Prototypes

Insider tips

Study habit feedback

Task breaking-down

Slack App

Study Buddy APP 12: May 31st, 2020

Awesome! Our next step is implementing your 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

Message input field with rich text editor icons: bold, italic, underline, code, quote, list, etc.



StudyBuddy Prototypes

 **Insider tips**

 **Study habit feedback**

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

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

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

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

 **Slack App**

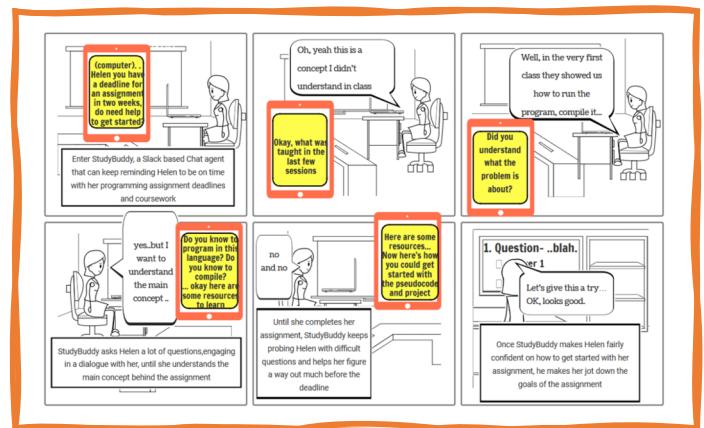
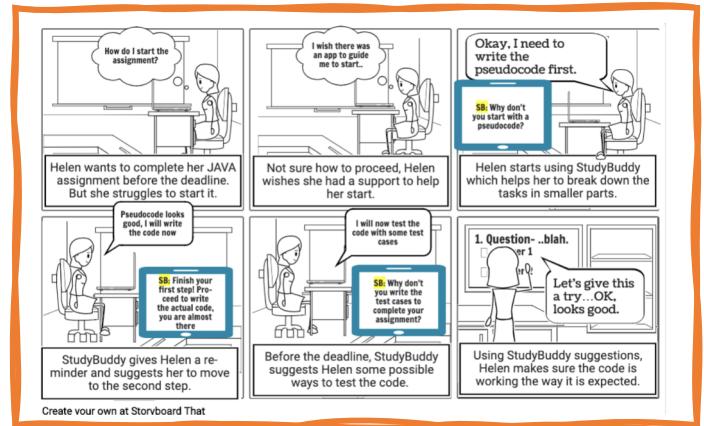
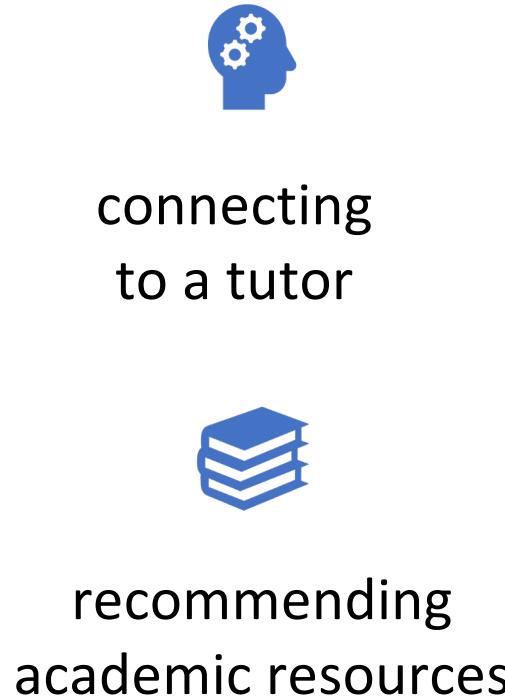
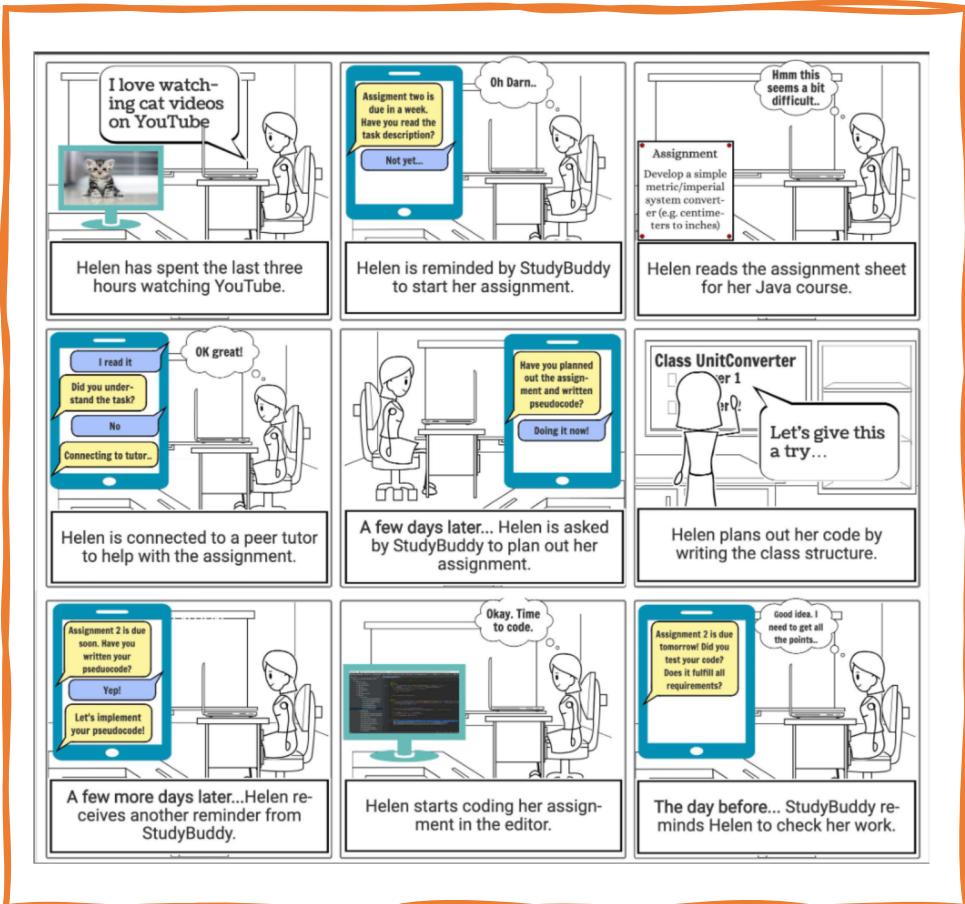
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 Freshman User 12:40 PM Message StudyBuddy



StudyBuddy Prototypes: Storyboards



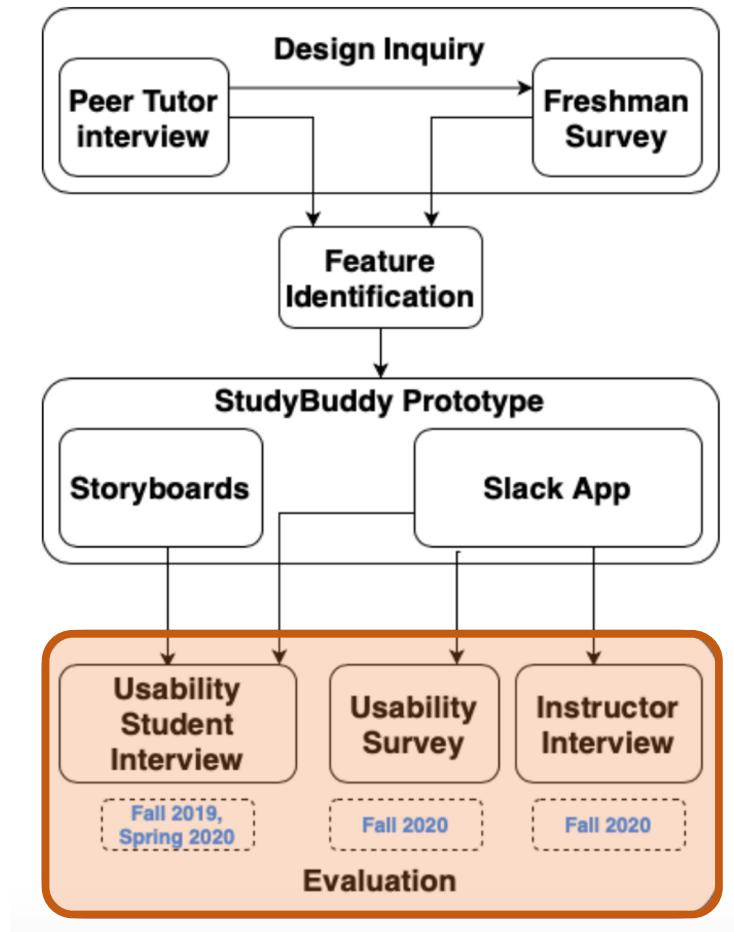


StudyBuddy Implementation

- Demo video: <https://youtu.be/bLIDL5UCMeI>

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Design Flowchart



Evaluation



Student Interview

8 students
first-year and senior
students



Usability Survey

117 students
All year groups of
undergrads



Instructor Interview

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



Design recommendations

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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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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 program will be much easier to implement.	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 hide functions in your program.	6	7	5	5	6	4	5	5
6		To debug a program you can place print statements in a 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
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3		Always write code in incrementally functional bits.	5	2	3	4	9	6	4	6
5		It is always a good idea to hide functions in your program.	6	7	5	5	6	4	5	5
6		To debug a program you can place print statements in a 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.it's okay to take a break.	4	4	10	8	1	5	1	9
7		When the bot gets angry, get on its side.	10	10	2	9	4	7	2	8
11		Coffee is your second friend.	11	11	11	11	11	11	11	10

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

- Variations among individuals



Design Lesson Learned 1:

Personalizing the chatbot experience

Overall ranking	Category	Tip content	Ranking by each participant (The darker indicates higher rank)
1	Functional	If you're stuck with something, try visualizing, pen and paper!	f1 f2 f3 f4 s1 s2 s3 s4 1 1 6 3 2 1 3
2	Functional	Before you go to sleep, make sure to take a break.	
3	Functional	Algorithms is what makes us stand out from others, you are good at this.	
5	Motivational	It is a good idea to have a break after a long study session.	
6	Motivational	To do well in exams, you need to have a good study plan.	
9	Motivational	The debugger is your friend.	
10	Motivational	Algorithms is what makes us stand out from others, you are good at this.	
4	Motivational	If you're studying late in the night, make sure to get some sleep before the test.	
7	Motivationalit's okay to take a break.	
8	Motivational	When the going gets tough, the tough gets going!	
11	Motivational	Coffee is your second friend.	



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



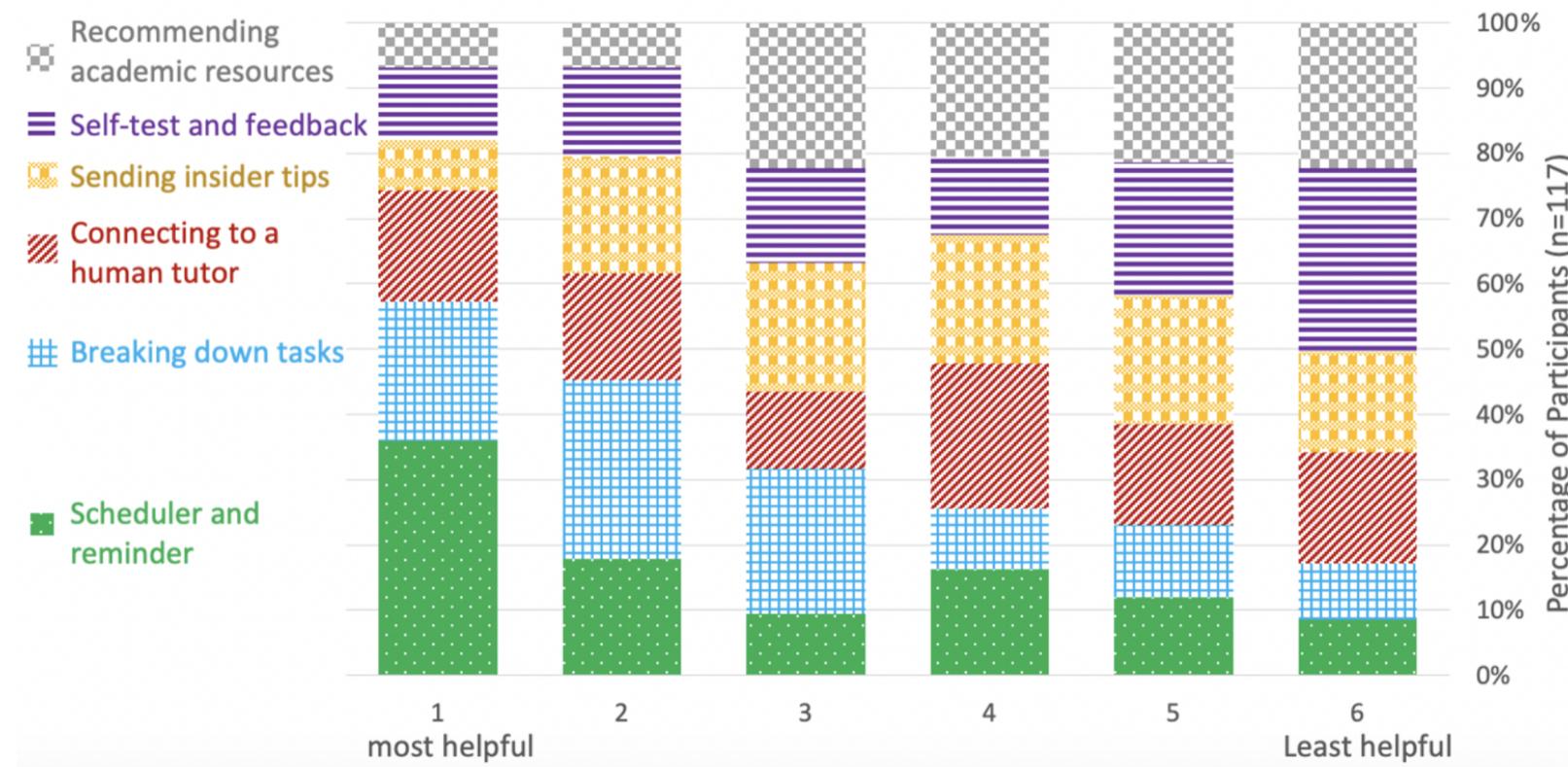
Design lesson learned 2

Gender and individual
differences

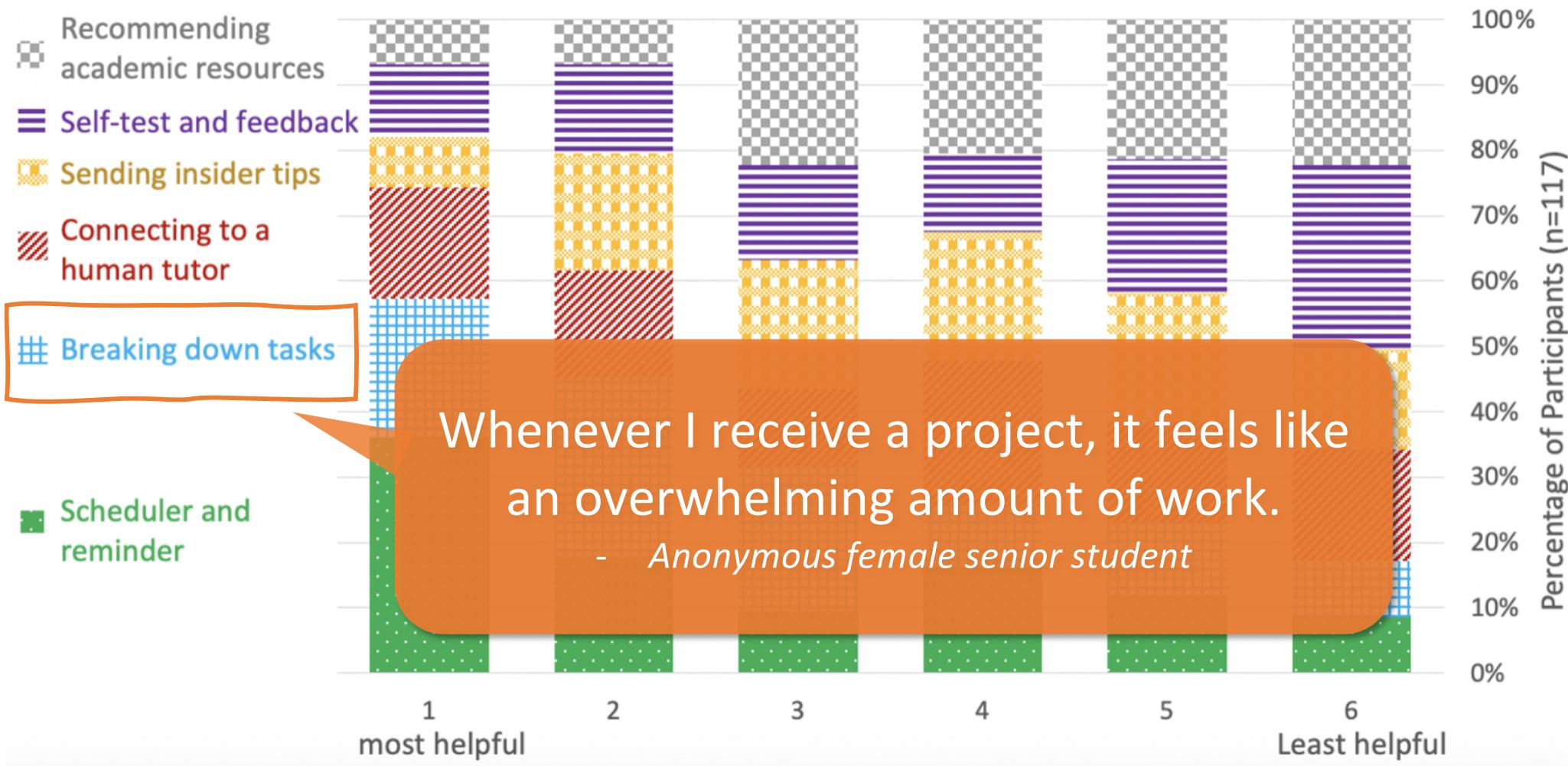


Student usability survey

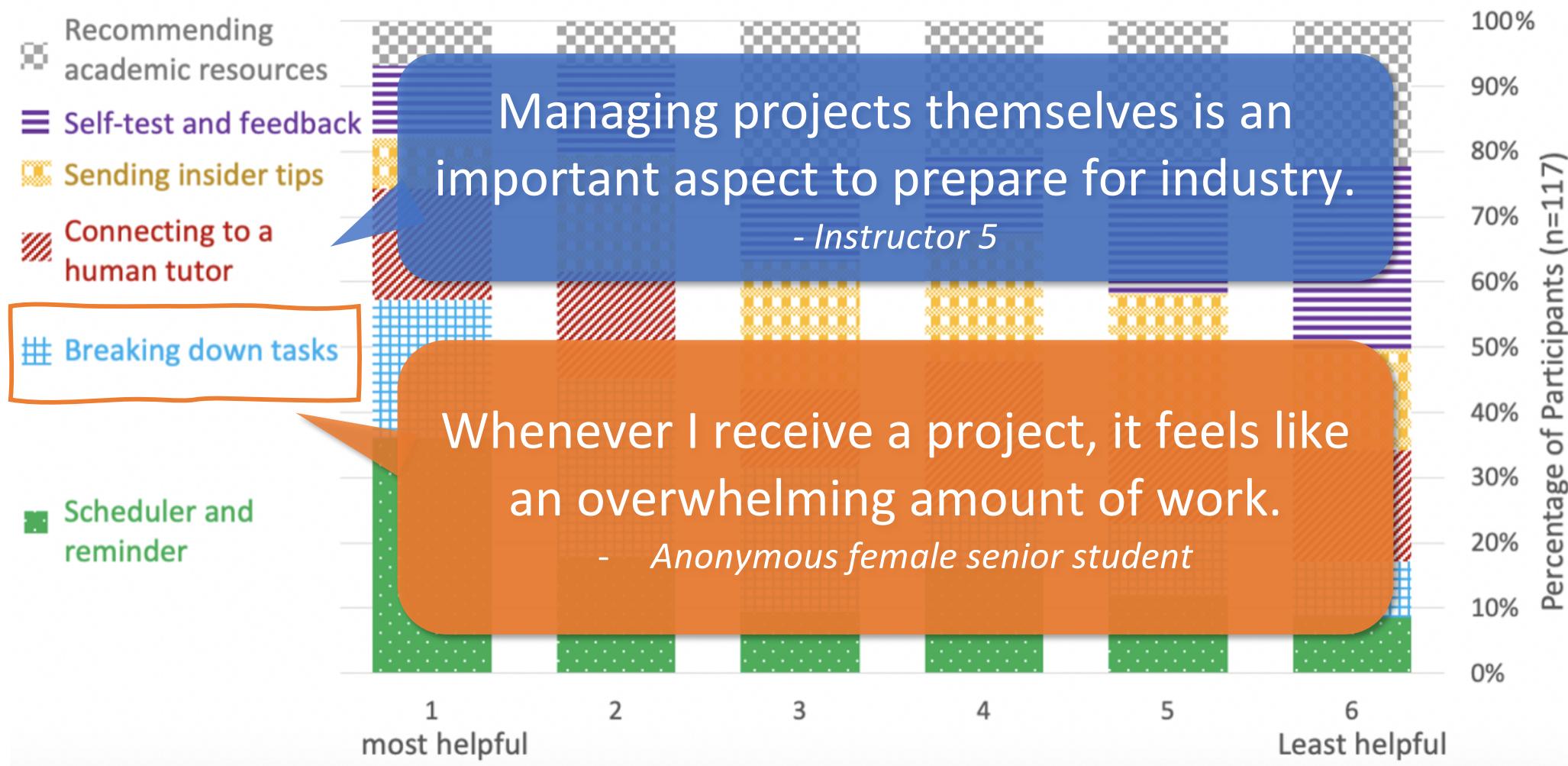
- Student ranking of designed features



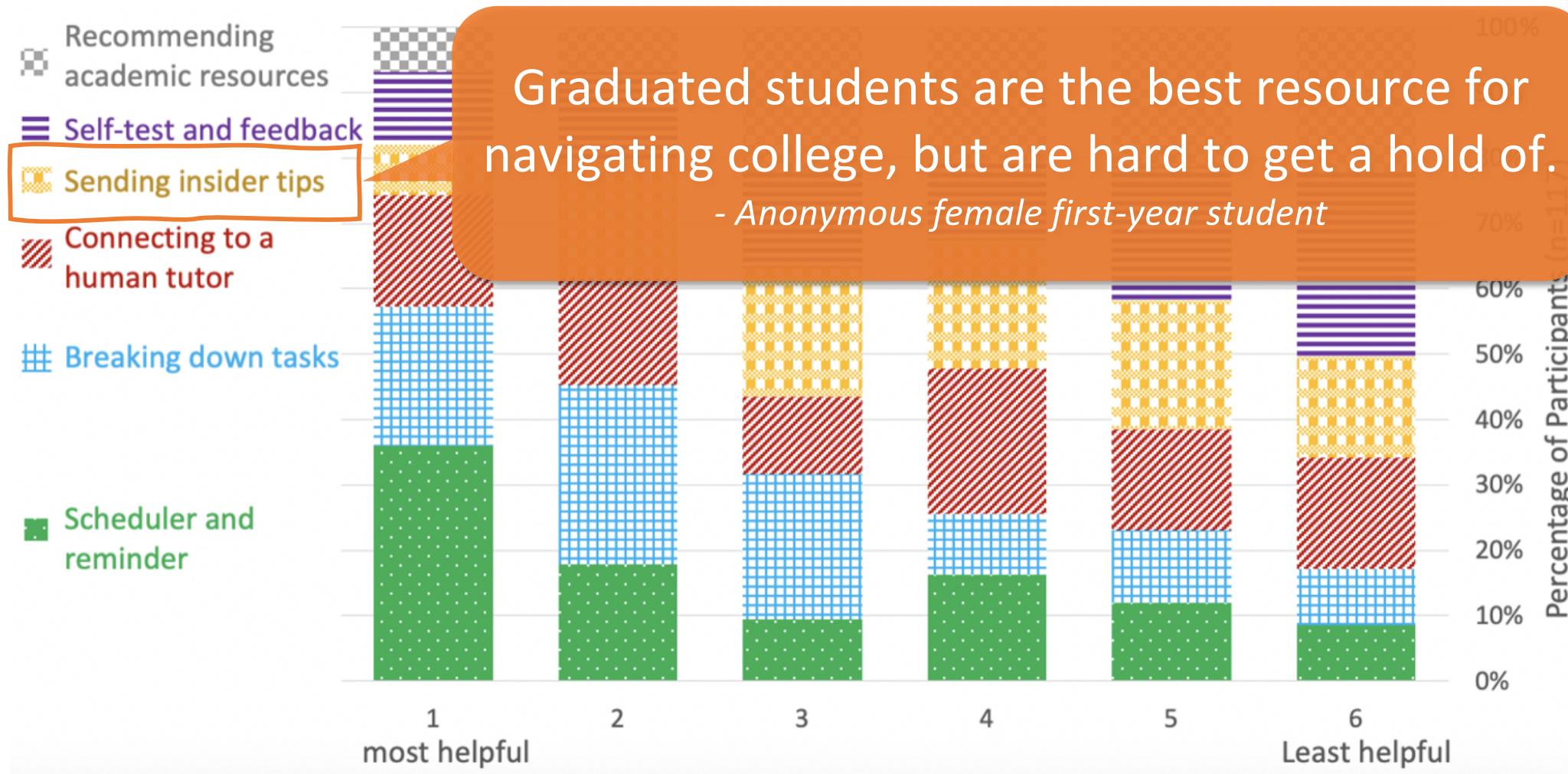
Feature Perception: instructors vs. students



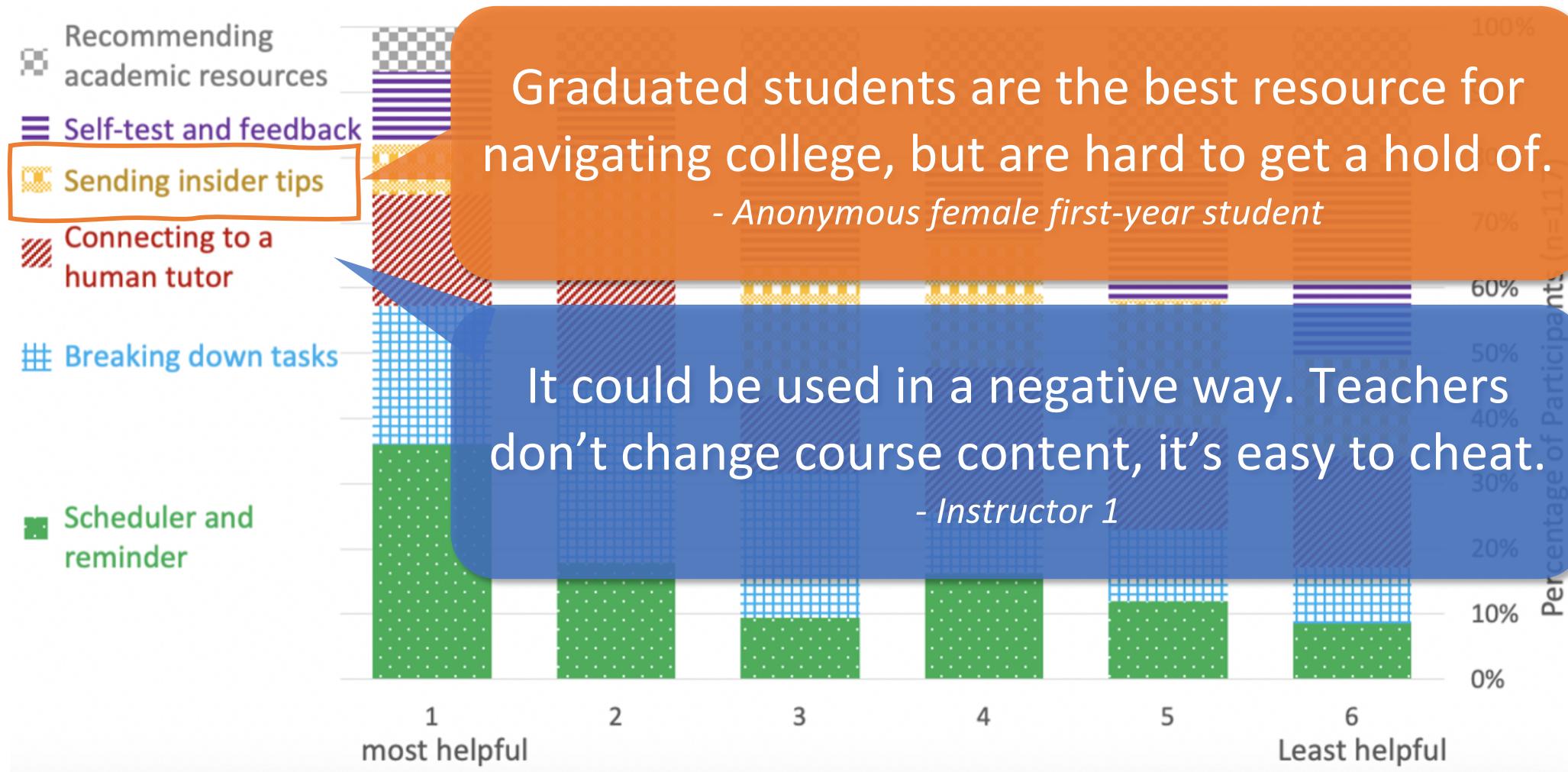
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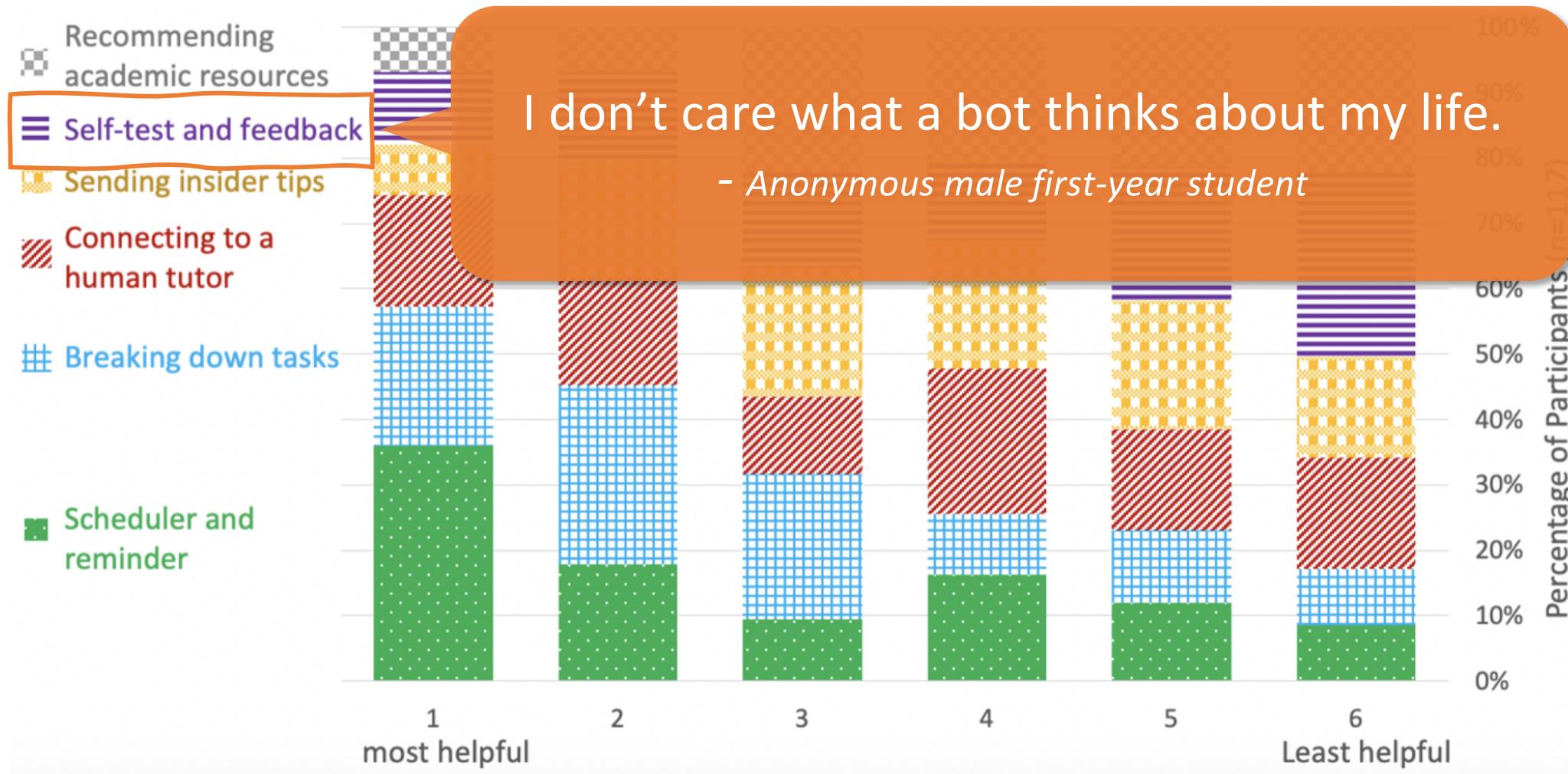
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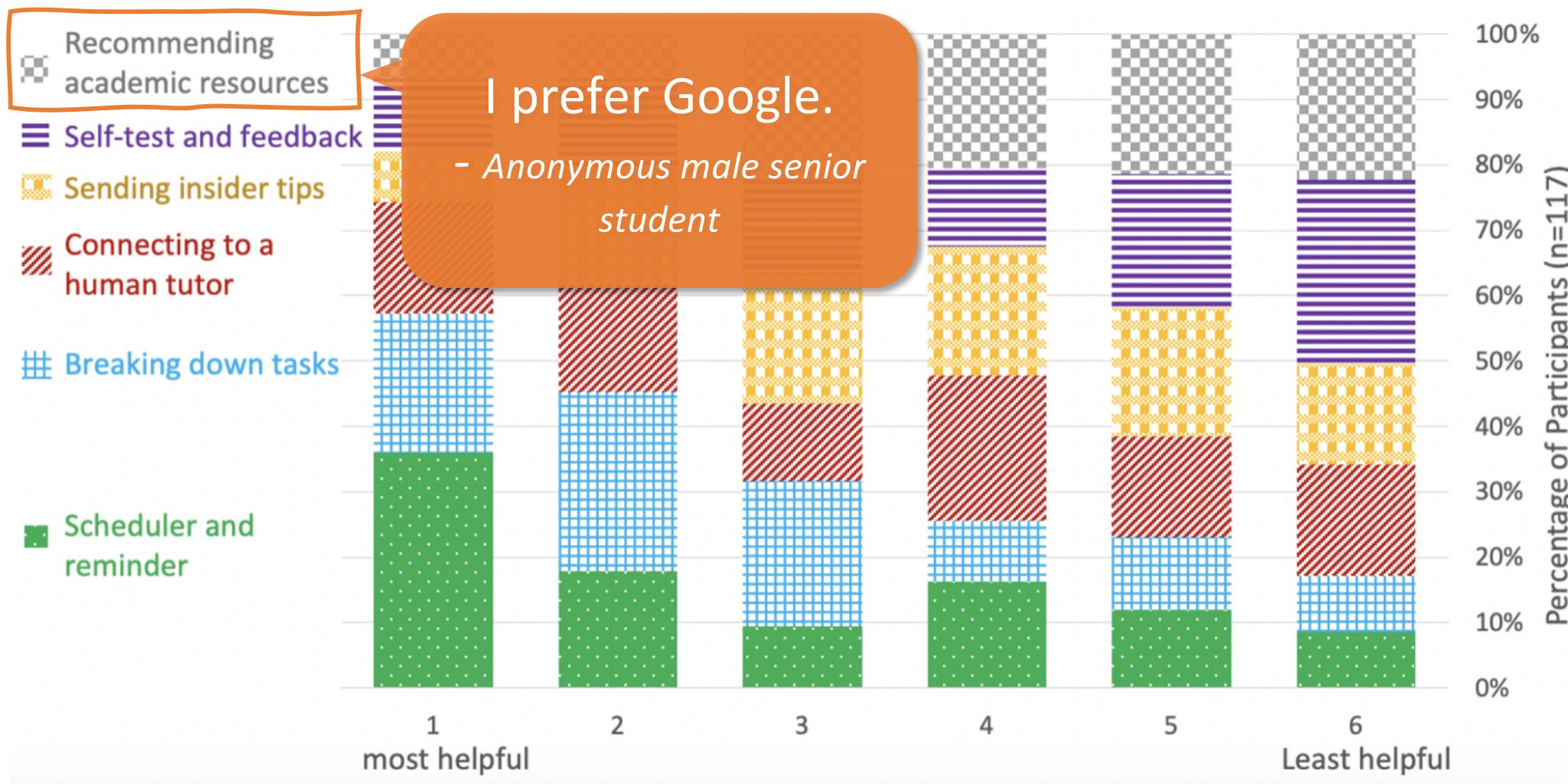
Feature Perception: instructors vs. students



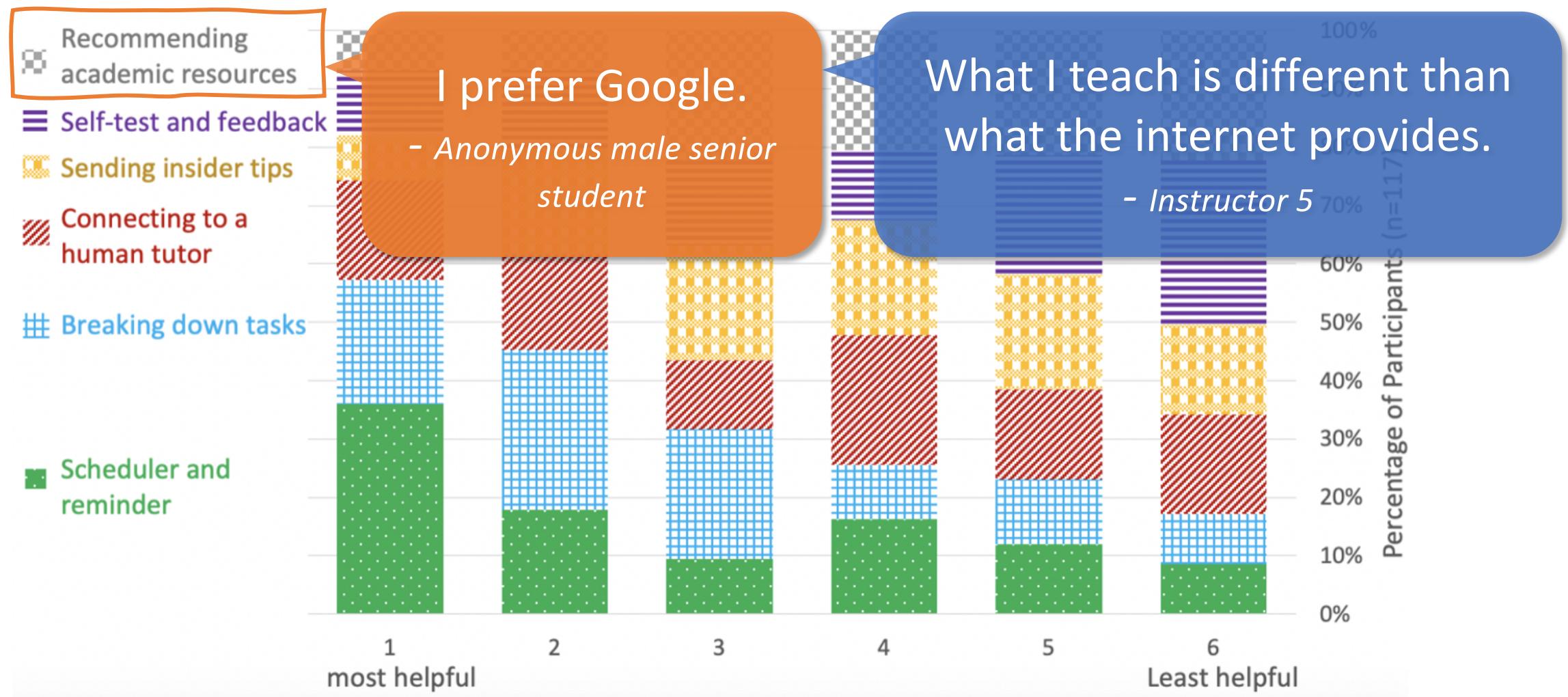
Feature Perception: instructors vs. students



Feature Perception: instructors vs. students



Feature Perception: instructors vs. students



Feature Perception: instructors vs. students





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



Xiaoyi Tian



Zak Risha



Ishrat Ahmed



Arun Balajiee
Lekshmi Narayanan



Jacob Biehl

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