

# Interview Design

Overview:

Flow #	Flow #	Description Plus Question Type During Problem-Solving
Tutorial		Tutorial
Summary Screen	0	Interview Questions and Wrap
AI, No Exp	1	Control, Solve, Feedback
Shared, No	2	Control, Solve, Feedback
Learner, No	3	Control, Skip Solving (Quick Walkthrough), Feedback
AI, Expl.	4	Control, Skip Solving (Quick Walkthrough), Feedback
Shared, Expl.	5	Control, Skip Solving (Quick Walkthrough), Feedback
Learner, Expl.	6	Control, Skip Solving (Quick Walkthrough), Feedback
Control Rank	7	Students rank the three versions of control on a control spectrum and motivate which one(s) they prefer

## Introduction

Hi, my name is <NAME>. I am a researcher at <INSTITUTION>. We are developing an app to practice math equations. But the app is not really working yet. I want to show you the sketches we made and you need to pretend that it's a real app. I'm interested in your feedback on the design and the functionalities, so I will ask some questions. We will still change many things in our sketches so you can say whatever you want. We really want to learn from *you*. If, at any point, you want to stop the interview or skip a question, that's fine. Also, you might need to solve some exercises, but don't worry, your performance will not impact your grades, it's just for testing. Let me explain the plan.

The interview has 3 parts:

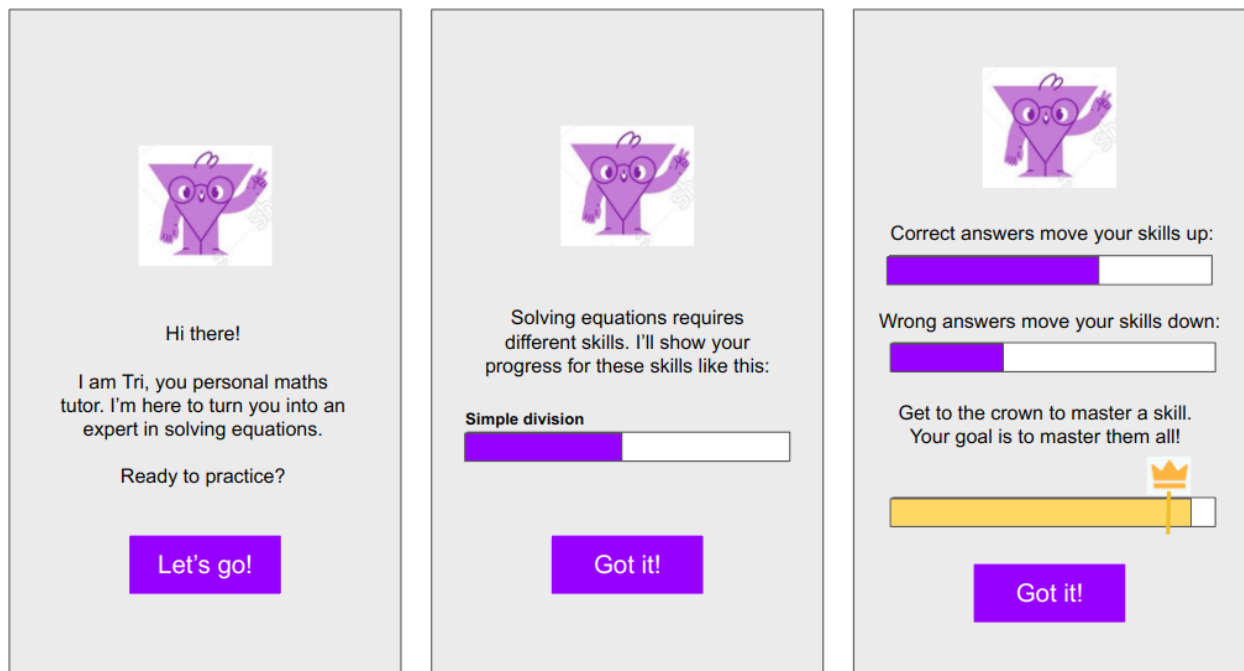
1. In part 1, I will show you 3 designs, which are about how you choose your next exercise.
2. In part 2, I will show you 3 similar designs, but with some differences.
3. In part 3, I will ask you some more general questions about which designs you liked most.

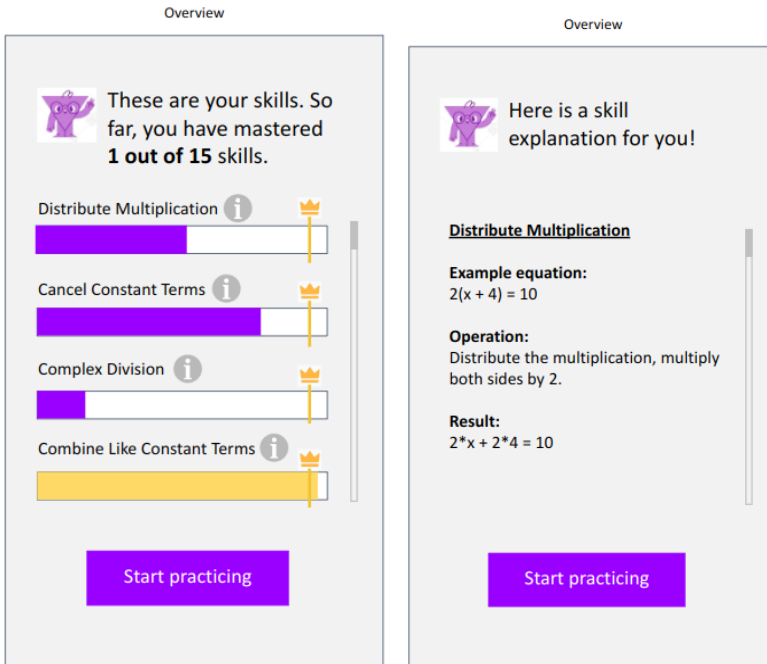
For each design, I will give you some tasks and ask you some questions. Throughout the interview, the goal is that you think out loud as much as possible. So you can say whatever you want. The more you talk, the more I can learn from you.

Alright, I am now going to send you a link to show you the app design we have developed. Could you please share your screen and click on “Slideshow”? Great. Before we start I want to ask two questions:

- What is your age and grade level?
- Think of solving math equations. When do you think you master solving equations?
  - Do you think you need different skills to solve equations?

Go ahead and pretend this is a real app. Can you explain how the app works? You may read things out loud.

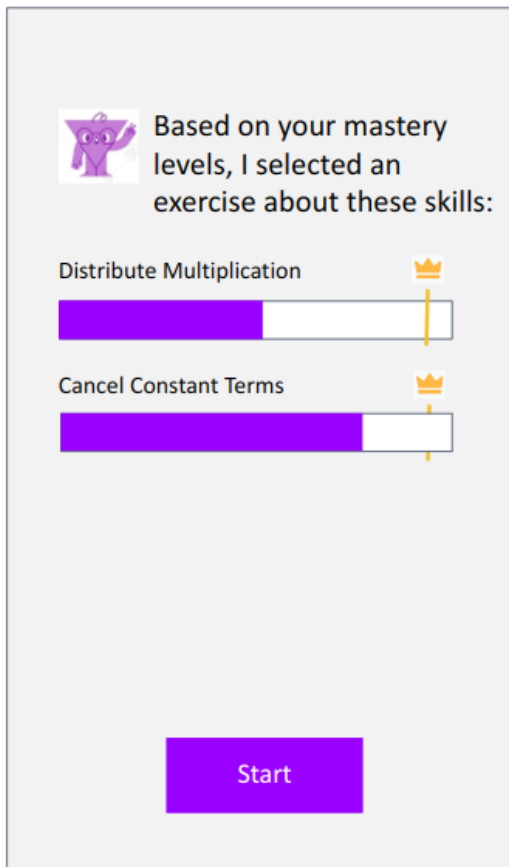




- What do you see on this screen?
- What do the bars tell you?
- Do you remember what the overall goal of the app is?
- Can you explain what these skills mean (e.g., “distribute multiplication”)?
  - What would you do if you did not know what they mean?
  - Do you find this information helpful?
- What does it mean if you have reached the crown in a skill?
  - Would you prefer something else instead of a crown, for example, a finish line emoji?
- What do you think about this screen overall? Is there anything you would change?

## Part 1

Flow #1 AI, No Expl.

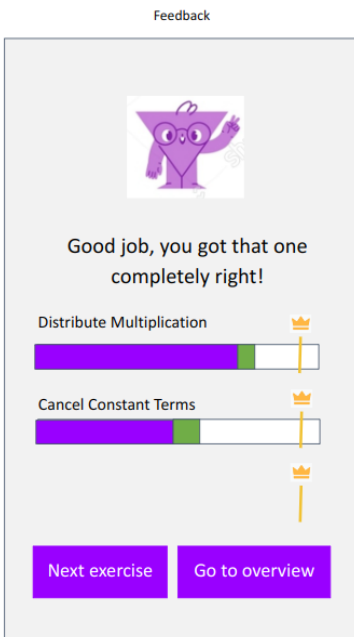


- What do you see here?
  - What do you think about replacing these skill names with colors or animal names or something similar?
- Do you know how the tutor selected an exercise?
  - Do you feel you have enough information on how the app chose the exercise?
  - Would you want to see this information? When?

Now imagine you want to solve the exercise. Here is an example of what the tutoring software could look like. You might have seen something similar before. The tutoring software allows you to enter substeps to the linear equation problems and can give you error feedback and hints when you are stuck.

<https://cborchers.com/img/lynnette.gif>

Let's suppose you have everything right.

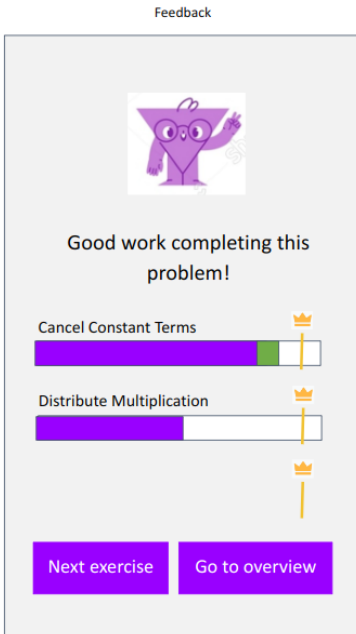


- What do you see here?
  - What do you think about replacing these skill names with colors or animal names or something similar?
  - Would you like to get more feedback at this point? What kind of feedback?
- Is there anything else you want to say about this screen?

Now start a new exercise. We are back at the same screen from before.

- What if you don't disagree with the tutor's suggestion?
  - Explain to me when you would agree or disagree with a suggestion.
  - Would you want to choose your own skills? When?

Imagine your first substep is wrong but then you correct it.



- What do you see now?
  - Would you like to get more feedback at this point?
  - What if you make many mistakes?
- What do you think about seeing the skills update live *during* problem solving, so on the previous screen? Would you like it when you get a substep correct? What if the substep is incorrect?

Flow #2 Shared, No Expl.

Now we will do the same thing but with design 2.

Shared control without explanation

Select the skill(s) you want to practice next

Handle exercises like  $2x = 3$

Handle exercises like  $x = 3$

Handle exercises like  $2x + 4 = 3$

Handle exercises like  $2(x + 1) = 3$

Start

- What do you see here? What changed compared to before?
- What do you think about that?
  - Is everything clear to you?
  - Do you like it that you can select skills yourself here? Why or why not?
- What do you think of the skill names?
  - Would you want to see the info buttons from before here too? Or do you want to change the names into something else?
- What do you think about this design overall?
- Which skills would you like to practice and why?

For now, imagine you select the second skill.

- What do you think will happen when you hit *Start*?
- Do you want more information about what you are now practicing? Or do you want more information on what is going to happen next and why?

Imagine you solve the exercise. Start another exercise. We are back at the selection screen from before.

- What would be your general strategy for selecting skills?
  - Would this change based on when/how/with what mood you are doing your homework?
  - Imagine you are doing well on some skills and not so well on others. Which skills would you select?
- Do you have an idea how the app selects an exercise after you select your skills?

- Would you like to see this information? When?

### Flow #3 Learner, No Expl.

Now we will do the same thing with design 3.

Full learner control without explanation

The screenshot shows a user interface for selecting an exercise. At the top left is a purple cartoon character icon. To its right is the text "Select the exercise you want to start next". Below this is a section titled "Chance you can solve it" with a "Sort" button. There are 10 exercises listed, each with a progress bar. Exercise 4 is highlighted with a purple border. At the bottom is a large purple "Start" button.

Exercise	Chance you can solve it
Exercise 1	~80%
Exercise 2	~70%
Exercise 3	~60%
Exercise 4	~50%
Exercise 5	~40%
Exercise 6	~30%
Exercise 7	~20%
Exercise 8	~10%
Exercise 9	~5%
Exercise 10	~2%

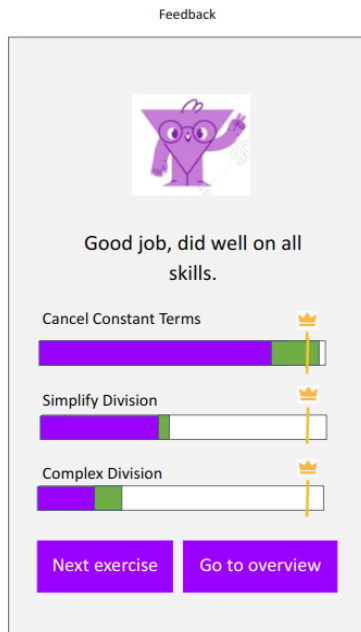
- What do you see here? What changed compared to before?
  - What do you think about that?
  - Is everything clear to you? Explain to me what the bars represent.
  - Do you like it that you can select exercises yourself here? Why or why not?
- What else would you want to know about the exercise to select one?
- What do you think about this design overall?
- Which exercise would you pick? Why?
  - Would you pick exercises with long or short bars?

For now, imagine you choose exercise 4.

- What do you think will happen when you hit *Start*?

Imagine you solve the exercise completely right.





- Given this, is there anything you would like to learn about in terms of how well you did on the problem?
  - How would your answer change if your skill updates would be negative for all skills?
- Given this update, what would you do differently the next time you practice?
- How would your answer change if your skill updates would be negative for all skills?

Start another exercise. We are back at the selection screen from before.

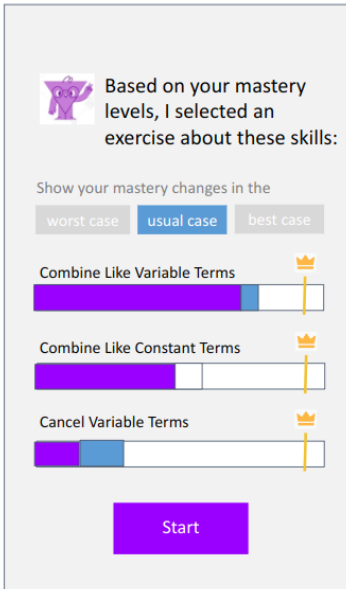
- What would be your general strategy for selecting exercises?
  - Would this change based on when/how/with what mood you are doing your homework?
  - Imagine you're solving most exercises correctly. Would that change which exercises you pick?
  - Imagine you're making a lot of mistakes. Would that change which exercises you pick?
- Remember the tutor wants you to master all *skills*. What do you think now that you can select *exercises* but not *skills*?

## Part 2

Okay, let's briefly recap the 3 designs. Now, I want to show 3 similar designs that have some extra information. From now on, we will also go more quickly through the screens for solving exercises and feedback.

## Flow #4 AI, Expl.

Remember from before the tutor would suggest skills to practice. Here is design 4.



The screenshot shows a user interface for tracking skill mastery. At the top, a purple robot icon is next to the text: "Based on your mastery levels, I selected an exercise about these skills:". Below this, a section titled "Show your mastery changes in the" contains three buttons: "worst case", "usual case" (which is highlighted in blue), and "best case". Underneath are three rows, each representing a skill: "Combine Like Variable Terms", "Combine Like Constant Terms", and "Cancel Variable Terms". Each row has a horizontal bar with a yellow crown icon to its right. The bars are filled with purple and blue segments, indicating different levels of mastery. At the bottom of the interface is a large blue button labeled "Start".

- What do you see here?
  - Is everything clear to you? Explain to me what you think “worst case”, “usual case”, and “best case” means.
  - Do you like the extra information on this screen? Would you like to see it during homework practice? Why or why not?
  - How would you use this information?
- Do you want to see all three buttons or only one or two of them? Why?
  - Which one is most helpful to you?

Imagine you solve an exercise and want to start a new one.

- What if you don’t disagree with the tutor’s suggestion?
  - Explain to me when you would agree or disagree with a suggestion.
  - Would you want to choose your own skills? When?
- Is there anything else you want to say about the overall design?

## Flow #5 Shared, Expl.

Remember from before you could select skills yourself. Here is design 5. Imagine you select the second skill.

Select the skill(s) you want to practice next

Combine Like Variable Terms

Combine Like Constant Terms

Cancel Variable Terms

I found an exercise. The bars show how your mastery would change in the

worst case usual case best case

Start

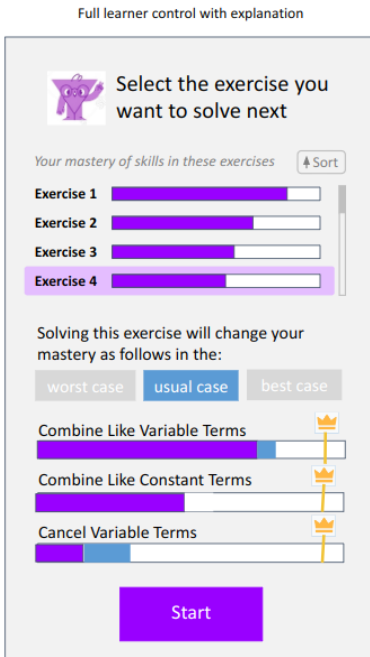
- What do you see here?
  - Is everything clear to you? Explain to me what you think “worst case”, “usual case”, and “best case” means.
  - Do you like the extra information on this screen? Would you like to see it during homework practice? Why or why not?
  - How would you use this information?
- How would you decide which skills to select?
  - Would this change based on when/how/with what mood you are doing your homework?

Imagine you solve an exercise and want to start a new one.

- You can only see the blue/green/white bars for the skills you select. Would you want to do that for all skills, even if you don’t select them?
- Is there anything else you want to say about the overall design?

Flow #6 Learner, Expl.

Remember from before you could select exercises yourself. This is the last design. Imagine you select exercise 4.



- What do you see here?
  - Is everything clear to you? Explain to me what you think “worst case”, “usual case”, and “best case” means.
  - Do you like the extra information on this screen? Would you like to see it during homework practice? Why or why not?
  - How would you use this information?
- How would you decide which skills to select?
  - Would this change based on when/how/with what mood you are doing your homework?
  - Imagine you’re solving most exercises correctly. Would that change which exercises you pick?
  - Imagine you’re making a lot of mistakes. Would that change which exercises you pick?

Imagine you solve an exercise and want to start a new one.

- Remember the tutor wants you to master all *skills*. What do you think now that you can select *exercises* but not *skills*?
- Is there anything else you want to say about the overall design?

## Part 3

Thank you for walking through these designs! Let's recap. You have seen six different ways of selecting problems in the tutor. Open the link to Miro.

[MIRO BOARD LINK]

- Order the 6 designs in terms of how much control you feel you have over what you want to practice. There are no right or wrong answers.
  - Why did you choose this order?
- Order the 6 designs from your least favorite to most favorite.
  - Why did you choose this order?
- Is there anything you still want to say about these designs now that you see them all together?
- Suppose you can create your own selection screen. How would you want to select the next exercise? What information would you want to see on the selection screen?
- For the designs where the tutor selected skills, why do you think the tutor selected the skills it selected?
  - What do you think about that strategy?
  - What do you think about replacing these skill names with colors or animal names or something similar?

Backup questions (if there is time):

- What do you think is the best way to master all skills?
  - What do you think moves the skill bars up and down? What happens during problem solving when someone gets their skill bars up and down?
  - If someone solved an exercise completely right, but got a higher increase in one skill than another, why do you think that is?
  - How do you feel about the bars going down?
  - What do you think about counting your math homework as completed only once all skill bars are filled up?
  - What skills would you tackle when and in what order? Consider that problems can exercise multiple skills at the same time.