Heuristic Evaluation of click**ed**

1. Problem

click**ed** is an app that permits the discrete communication of confusion or uncertainty in a classroom setting, avoiding the embarrassment of asking a question aloud. It also allows the teacher to know when a critical mass of students are confused, and to check what specifically they were confused about after lecture to modify the lesson plan for the next lecture.

2. Violations Found

H2-1

[H2-1 Visibility of System Status] [Severity: 3] [Found by: A]
"I Understand" button does not seem to do anything from the student perspective. No output is displayed when students tap "I Understand" and it seems that students would be less inclined to tap "I Understand" than "I'm Confused". Provide feedback for users when they tap "I Understand" or consider removing the button.

[H2-1 Visibility of System Status] [Severity: 2] [Found by: A]
It is currently unclear how the number of students in the class will be updated. Does this happen automatically as students put the 5-digit code into their own phones? Do teachers get a notification when students have added their class? Consider displaying the number of students enrolled in real-time and/or notifying the teacher when students enroll in their class.

[H2-1 Visibility of System Status] [Severity: 2] [Found by: C]
New student user wouldn't necessarily know when to click on the specific class. User may wonder whether they should click before class, during class, or after class. One suggestion would be to add wording on the "My Classes" screen such as "Which class are you currently in?"

[H2-1: Visibility of System Status] [Severity: 3] [Found by: B]
After you submit a question or confusion report, there is no acknowledgement of the receipt of this information, nor is there any sense of next steps. This could be something as simple as "Thanks for asking your question! The teacher will get to it soon." This constitutes lack of visibility of status because this interface could be misconstrued as simply not working (ie the question just isn't submitting, for instance).

[H2-1: Visibility of System Status] [Severity: 3] [Found by: B]
No record of questions that have already been asked exists in the student view as per this medium-fi prototype. Perhaps previously asked questions should be shown in the student view as well so that (1) students can know that their questions have been received and (2) duplicate questions can just be upvoted rather than repeated.

[H2-1: Visibility of Status] [Severity: 2] [Found by: B]

The image shown while the teacher was lecturing, of a satellite scanner, is not a good match for the actual status of the app at the time, which is passively collecting questions. I would replace this image with an animation or picture that better represents what is actually going on during this phase of app use.

H2-2
[NONE]

H2-3

[H2-3: User Control & Freedom] [Severity: 2] [Found by: D]
After you click the "student" or "teacher" button, there is no "back" button to backtrack in case you clicked one of these accidentally. Simple fix: just add a back button.

[H2-3: User Control & Freedom] [Severity: 2] [Found by: B, D]
If a student adds class by mistake, or if he drops out of that class, or simply if the semester is finished, he should be able to delete the class from the app, yet the app does not seem to support that functionality. Simply add a "delete" button in this screen for classes or something of the sort.

[H2-3 User control & Freedom] [Severity: 2] [Found by: A, C, D]
After clicking the I'm confused button, there is no way to "undo." I'd suggest adding a "back" button to the "What are you confused about?" popup.

[H2-3: User Control & Freedom] [Severity: 2] [Found by: C, D]
When you create a class, there is always the possibility that you created the class by accident, and you may want to delete it, or simply rename it. This is a simple fix: add a "delete" and/or "edit" function for classes.

[H2-3: User Control & Freedom] [Severity: 3] [Found by: A, B]
Users (teachers) are confined to entering just 3 topics, which then limits the number of things that students can be confused about. In addition, if they add no topics, it is unclear what will be displayed for the student, and if they can even choose any topics. Could more fields be added? This also limits the format of questions asked – perhaps the "do you have any other questions" feature can be emphasized? This format should be highlighted.

[H2-3 User Control & Freedom] [Severity: 1] [Found by: A, C]
Currently it does not seem possible for a student to select a topic he/she is confused about *and* ask a question. Once the student goes to ask a question, the checkmarks next to the selected topics above disappear. I'm not sure if this is just a limitation of the prototype, but I would suggest allowing students to perform both actions in one submission.

H2-4

[H2-4: Consistency & Standards] [Severity: 2] [Found by: D]
This may just be an error with the prototype, but when hitting "back" to go back to the basic screen with just the "pre-calculus" class present, and then you touch the pre-calculus button, it always sends you to the "confused/not confused" screen, regardless whether you are a student or teacher. Make sure it sends you back to the correct screen, be you a student or teacher.

[H2-4: Consistency & Standards] [Severity: 1] [Found by: C, D]
In the "what are you confused about" screen, the weight and size of the lines between the categories (fractions, equations, variables, proofs) is not consistent. This may lead the user to believe that the two middle categories may somehow be related, which I am pretty sure is false. Just make sure that all these lines are the same.

[H2-4: Consistency & Standards] [Severity: 2] [Found by: D]
When you are on the screen for a certain lesson, as a teacher, you can see which sub-categories how many students for confused about (such as "FOIL: 15 students"). However, then, when you click on a specific student, the same layout appears, but instead saying something like "FOIL: 5 responses". This is very ambiguous and confusing. Do you mean that that specific student responded 5 times that he was confused about FOIL? That would be my assumption, but it is unclear, so maybe change the text above that box to read "most confusing topics for [student name]". Similarly, change the text above the questions to "questions by [student]".

[H2-4 Consistency & Standards] [Severity: 2] [Found by: C]
On the in-class page, the buttons are large round buttons. However, across the rest of the app, all other buttons are the standard rectangular buttons. I understand the intention is to really draw focus to these friendlier buttons, but I'd also worry a few users may not completely understand these are buttons. Thus, I'd suggest sticking to red and green versions of your standard rectangular buttons, though they could be larger.

[H2-4 Consistency & Standards] [Severity: 2] [Found by: C]
On the teacher class screen, the number of enrolled students and the class code looks like it is in a text entry field. Perhaps the intentions are to highlight these numbers, but as a user, I'd think to click and edit these numbers. I'd suggest simply making these numbers bold or larger than the other text.
+1 for "Derivatives" page

[H2-4 Consistency & Standards] [Severity: 1] [Found by: A]
Currently, it is unclear if "Your Students" on a particular past lecture page refers to all students in the class or only those struggling. Consider clarifying this by changing the wording to either "Students" or "Students Who Need Help", depending on if the list is of all students or only those struggling.

[H2-4 Consistency & Standards] [Severity: 1] [Found by: A]
On an individual student's profile (e.g., Gordon), it displays a number of "responses". I assume this refers to how many times the student tapped "I'm Confused" and selected a particular topic, but the wording of "responses" is a bit vague. Consider clarifying this wording with an alternative such as # "I'm Confused", # "taps", or # "confused responses".

H2-5

[H2-5: Error Prevention] [Severity: 3] [Found by: B]
I noticed that whenever a student taps into a class, they are immediately directed to the confused/understand screen. This is in contrast to the teacher interface, where the teacher is prompted to initiate the class. The student interface should be altered to account for the possibility that class is not in progress currently; if the interface were to run without doing this check, it could cause errors.

[H2-5: Error Prevention] [Severity: 3] [Found by: C, D]

On the "radar" screen, the back/end button is very accessible. Although there is a more info button that explains when to press the end button, there is no guarantee the teacher will click this button before clicking the end button. If they accidentally click the end button before finishing the lecture, there is no way to restart the lecture. Thus, I'd suggest having a small popup when the end button is clicked with wording such as, "This will end the current lecture. Are you sure you want to end?" The options could be "Continue Teaching" and "End Lecture" with an additional checkbox to "Don't show me this message again."

H2-6

[H2-6: Recognition not Recall] [Severity: 2] [Found by: C]
On the "Enter Lesson Name" popup, there is a decent amount of text for the teacher to fill out, presumably upon clicking "Start Lesson" at the beginning of the lecture. This could be bad if the teacher doesn't want to take time out of the class as they are trying to start the lecture. A neat feature could be a way to upload a syllabus and perhaps parse the information so the teacher is only selecting from lesson names and topics, though this would require a more technical implementation.

[H2-6: Recognition not Recall] [Severity: 2] [Found by: D]
This is more minor, but when you click on a specific lesson to see the feedback, and then you choose a student, you should add somewhere on that screen what lesson these comments are referring to, instead of having to hit back to see what lesson you are on, and then clicking on the student again. The same applies to both of these screens with what class you are teaching (e.g. pre-calculus versus calculus or something else).

[H2-6: Recognition not Recall] [Severity: 2] [Found by: A]
Currently there is no way to see a list of all students enrolled in a course unless the teacher is viewing a particular past lecture. Consider enabling the teacher to view a list of names on the main class page or provide a button that teachers can click to view all students.

H2-7

[H2-7: Flexibility & Efficiency of Use] [Severity: 2] [Found by: D]
It's not clear what happens when a student opens the application while a class is not in session, and therefore the teacher is not accepting responses. There should be an error message, or dialogue, that pops up when the user opens the application outside of class indicating that these responses will not be recorded. This would also be useful to indicate to the teacher that they have forgotten to open the app.

[H2-7: Flexibility & Efficiency of Use] [Severity: 3] [Found by: B]
The classroom setting is unpredictable and requires flexibility to be built into to any app that is used in that context. Teachers should have the option to pause lecture, tell the app when a concept is being repeated, or summon questions on the fly during the lecture if that is something they would like to do. All this could be facilitated by adding relevant buttons on the "lecturing now" screen.

H2-8

[H2-8: Aesthetic & Minimalist Design] [Severity: 2] [Found by: A, D]
In the teacher interface, when in a lesson, there is a button that says "more info", yet when clicked it only tells you where to press to end the lesson. This button feels irrelevant. It only clutters up the interface without doing much. To me the end button seems obvious enough on its own as it is, yet it you are really

attached to that dialogue maybe make it appear once when you start the lesson and then disappear. Alternatively, replace "more info" with "end lesson", and have that large button simply end the lesson, as that seems to be the only function that it performs.

[H2-8: Aesthetic & Minimalist Design] [Severity: 3] [Found by: A, D]
It seems like the "I understand" button is redundant. In class you mentioned that this may be possibly used for the teacher to ask flash polls, but nowhere in the teacher interface is this incorporated (i.e. there is nowhere for the teacher to see a dynamic map of the classroom and be able to gauge how many people are confused or understand the material). From the teacher perspective, no information is displayed to indicate who tapped the "I Understand" button. I would consider providing a way for teachers to view who has tapped the "I Understand" button or simply remove this button as it can be misleading and is not useful to the task flows.

[H2-8: Aesthetic & Minimalist Design] [Severity: 2] [Found by: D]
In the screen for a specific class, the "add students" button is confusing. It's at first unclear whether you have to click that button in order for students be begin being able to add the class, and even after the dialogue box exists it's unclear if you have to click that for every student individually or if they can just add the class whenever they want. I'm assuming (based on your presentation) that students can add the class whenever, and do not have to be prompted by the teacher. So to fix this, make sure it is obvious that that button is simply for information, and does not have to be clicked in order for students to be able to add the class.

[H2-8 Aesthetic & Minimalist design] [Severity: 3] [Found by: C]
On the "What are you confused about?" popup, there are several different things going on at once. When I see one of these types of popups in a mobile app, I generally am expecting to click once, or perhaps type a small amount of text (i.e. entering a wifi network password on iOS). I'd suggesting limiting the popup to either subject selection or question entry, or just make this a separate page.
+1 for "Enter Lesson Name" popup in teacher mode.

[H2-8 Aesthetic & Minimalist design] [Severity: 1] [Found by: C]
On the "Who are you?" page, the buttons are different than other buttons in the app. It seems like the most common layout is a white/gray screen with rectangular buttons with teal background and white text. This screen has a teal background, white buttons and teal text. If you want to keep the teal screen, and thus the white buttons, at the least I'd suggest changing the font weight to be the same as the "Who are you" text.

[H2-8 Aesthetic & Minimalist design] [Severity: 2] [Found by: C]
On the teacher class screen, I believe there are 5 different font sizes. Try to reduce this to 3 or less.

[H2-8 Aesthetic & Minimalist design] [Severity: 2] [Found by: C]
On the "Enter Lesson Name" popup, the "Cancel" and "Start Lesson" buttons are divided unevenly. Though I understand the "Start Lesson" button is trying to be emphasized, this can be accomplished with color or bold font while still having these buttons evenly divided down the middle of the popup.

[H2-8 Aesthetic & Minimalist Design] [Severity: 2] [Found by: A]
The interface has a light green/sea foam color scheme with a darker yellow/green graphic to indicate that "Class is in session!". These two greens clash a bit and are not very easy on the eyes when viewed together. Change the color of the graphic to match the color scheme of green/sea foam, white, gray, and black a bit more. Perhaps a similar green/sea foam color would be a nice touch.

[H2-8 Aesthetic & Minimalist Design] [Severity: 2] [Found by: B]

While the aesthetic on the medium fi prototype was relatively uncluttered, were more classes or more questions were to be added to the home screens of each interface, it would get very crowded quickly. The text size should be made bigger on these screens, and consider aggregating categories of classes or questions so they are easier to sort through.

 [H2-8: Aesthetic & Minimalist Design] [Severity: 1] [Found by: B]
This may have been the intention, but some features of the app design seem to invoke a "toy" aesthetic, perhaps targeted at very young children. Using just two colors has this effect, and all the buttons are large with heavy lines. If this was not intended, I would suggest adding a color and lightening up the lines throughout the interface.

H2-9

[H2-9: Help Users with Errors] [Severity: 2] [Found by: C]
On the "Derivatives" page, I'm a bit concerned that teachers will be startled and/or flustered by the aggressive error icon. I'd suggest making the initial error icon smaller (it currently takes up nearly half of the screen real estate). Additionally, I would add a constructive solution, perhaps telling the teacher to "pause lecture" or "consider reviewing the topic."

[H2-9: Help Users with Errors] [Severity: 2] [Found by: D]
For the teacher screens, when the message that a certain amount of students are confused pops up, why does it pop up then? For the prototype, why is 28 the appropriate critical mass of confusion for a message to appear? In addition, shouldn't the teacher be able to set this critical mass themselves, so that they aren't constantly perturbed by the system unless they want to? Maybe add functionality for the latter, and change the critical mass of students to a certain percentage of the class (i.e. "50% of students confused") to make it more clear why this message is appearing in the first place.

H2-10

[H2-10 Help & Documentation] [Severity: 1] [Found by: C, A]
The "Add Students" button does not provide any functionality for the teacher, but is rather an instructional button. "Add Students" implies that students can be added directly by the teacher, but in fact students are the ones adding themselves. Consider displaying the instructional pop-up about the code when the teacher first creates the class instead of the "Add Students" button. You could then offer a "help" button to re-display the pop-up if necessary.

[H2-10 Help & Documentation] [Severity: 1] [Found by: D,C]
When prompted to create a class, the sample message is "e.g. Pre-calculus", and it works here. However, when prompted to create a lesson within that class, the sample message is again "e.g. Pre-calculus", and this can be confusing because that same message appeared when creating the class, so you could imagine being unsure if you are creating a lesson or another class. Change that second message to something like "e.g. Derivatives".

[H2-10: Help & Documentation] [Severity: 1] [Found by: A]
The first few times a user uses the app, the jump from tapping into a class to being presented the confused/understand button is jarring and unintuitive. One helpful feature here could be to introduce a help button or provide further explanation by means of the layover format used in the teacher view.

3. Summary of Violations

Category	# Viol. (sev 0)	# Viol. (sev 1)	# Viol. (sev 2)	# Viol. (sev 3)	# Viol. (sev 4)	# Viol. (total)
[H2-1: Visibility of Status]			3	3		**6**
[H2-2: Match Sys & World]						**0**
[H2-3: User Control]		1	4	1		**6**
[H2-4: Consistency]		3	4			**7**
[H2-5: Error Prevention]				2		**2**
[H2-6: Recognition not Recall]			3			**3**
[H2-7: Efficiency of Use]			1	1		**2**
[H2-8: Minimalist Design]		2	6	2		**10**
[H2-9: Help Users with Errors]			2			**2**
[H2-10: Documentation]		3				**3**
Total Violations by Severity	**0**	**9**	**23**	**9**	**0**	**41**

4. Evaluation Statistics

Severity / Evaluator	Evaluator A	Evaluator B	Evaluator C	Evaluator D
sev. 0	NA	NA	NA	NA
sev. 1	56%	11%	56%	22%
sev. 2	22%	13%	39%	48%
sev. 3	33%	56%	22%	22%
sev. 4	NA	NA	NA	NA
total (sev. 3 & 4)	**33%**	**56%**	**22%**	**22%**
total (all severity levels)	**32%**	**22%**	**39%**	**37%**

5. Summary Recommendations

Overall, we really enjoyed playing around with the prototype. We thought it was a well-executed representation of the idea with clear thought and effort put into decisions surrounding UI/UX and visual design. One general theme of our heuristic suggestions stemmed from not having a way to go back on several screens. Particularly when using a new app, a user could get lost or find themselves poking around the app out of curiosity. Moving forward, we would also suggest you focus on defining what the "I Understand" button means. Currently, its purpose is a little vague from both the student and teacher perspective because the student receives no feedback once tapping that button and the teacher has no way of viewing who has said they understand a particular concept. If you are going to keep it in, we would suggest thinking about how to make its purpose more clear and also how to use it to collect and display "student understanding" data. Otherwise, consider taking out the button and simplifying the app altogether.

Although we know this is just a medium-fidelity prototype without significant attention paid to visual design, we believe there is room for improvement. The individual pages look really solid visually, but more work could be done to make visual design decisions consistent across all screens.

The boxy format of each class, each question, and each category within each question is redundant, and can probably more cleverly be presented. Moreover, as mentioned above, the use of heavy fonts and just two colors gave the app a "toy" aesthetic, which may have been the intention. Even if it was, it seems like

this aspect of the UI could be toned down or altered on the teacher interface. The teacher interface could perhaps be more clearly differentiated from the student interface as well. Finally, we would suggest thinking about which buttons are functional and which are merely providing a way for users to access helpful pop-up dialogs. Perhaps for the helpful pop-ups, a "help" button would be more helpful than "more info". Making the pop-up/help functionality more consistent across screens would be very beneficial.

Overall, a wonderful app! We're excited to see how this turns out.