

# Case Study: Tutor Side Student Improvements to Track Image During Lesson



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# Objectives

# Objectives/Method

**Objective:** A number of issues have been previously been identified within the student experience.

The goal of this research was to explore and vet out several solutions to these issues.

**How:** We utilized a usability/design research methodology where participants went through a series of core exploration tasks on different prototypes. For this study we will use an iterative process (RITE) where our research days will be spread out with time in-between to make changes based on our insights.

## Who:

- 10 students who are interested and open to receiving tutoring services for their class

The screenshot shows a chat window titled "Chat with Bob" on the Chegg platform. The chat history includes:

- A message from Bob at 1:23 PM: "Beautiful! That's a great normal curve. Now, what can you tell me about those percentages?"
- A message from Alice at 1:23 PM: "test"
- A message from Bob at 1:23 PM: "Let's look at a more detailed version of the normal curve. So, What do you notice about the percentages in this version?"

The chat interface features a "Send to chat" button at the bottom right. The chat content is displayed on a grid background. A detailed normal curve graph is shown, with the following data points:

Standard Deviation	Percentage
$-3\sigma$	0.14%
$-2\sigma$	5.39%
$-1\sigma$	24.17%
Mean	34.13%
$1\sigma$	24.17%
$2\sigma$	5.39%
$3\sigma$	0.14%

Hand-drawn annotations in blue ink on the grid show a normal curve with vertical lines at  $-2\sigma$ ,  $-1\sigma$ , Mean,  $1\sigma$ , and  $2\sigma$ . The area between  $-1\sigma$  and  $1\sigma$  is shaded and labeled "34%", and the area between  $-2\sigma$  and  $2\sigma$  is shaded and labeled "95.44%".

# Executive Summary

## HIGH LEVEL FINDINGS

# Executive Summary

Students have such a strong mental model of a synchronous whiteboard that the best way to counteract this may be changing the design of the actual scratch pad and interaction instead of relying on messaging which can be misperceived or ignored.

The "send to chat" button helped explain an asynchronous scratchpad, but wasn't always seen.

The "send to chat" button was successful in assisting students sending their image to the tutor. Additional cropping functionality as part of the process was preferred by students.

The pinning feature was valued by students and we should consider adding this feature as a way to help with upcoming subjects which are more visually focused like Biology and Engineering.

Students seemed to be attending to the conversation such that they may miss the pinning feature. How might we showcase this feature which students enjoy?

As a V2 feature, we should explore ways to allow students to view/transition through multiple pins.

# Problems To Solve

WHAT STUDENT ISSUES ARE WE ADDRESSING?

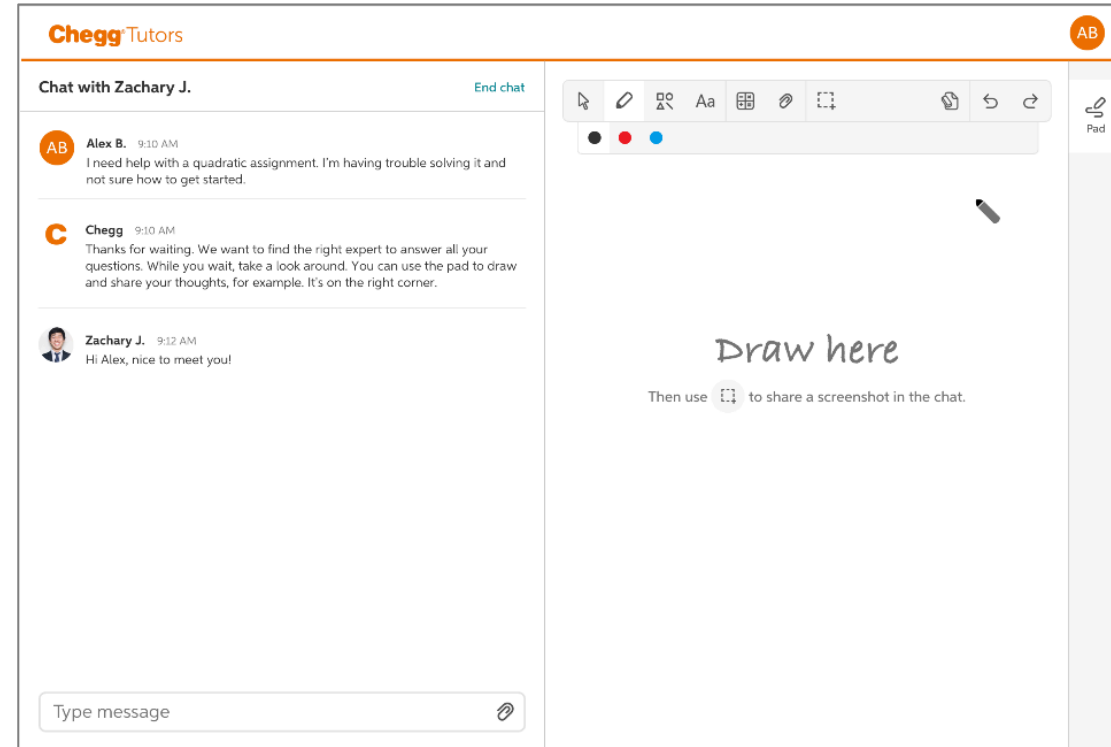
# Not understanding how to send screen shots

**Prior research\*** found that sending images via the scratchpad was challenging and many students failed to accomplish this task as students:

- 1) Didn't realize the scratchpad was asynchronous and not "real time"
- 2) Didn't understand how to send screenshots to the tutor.

**Students have such a strong expectation of a synchronous whiteboard due to:**

- Marketing messaging on the tutors site.
- Console layout in desktop gives a feeling everything is "live".
- For some students a desire to have a synchronous whiteboard.



# Not understanding how to send screen shots

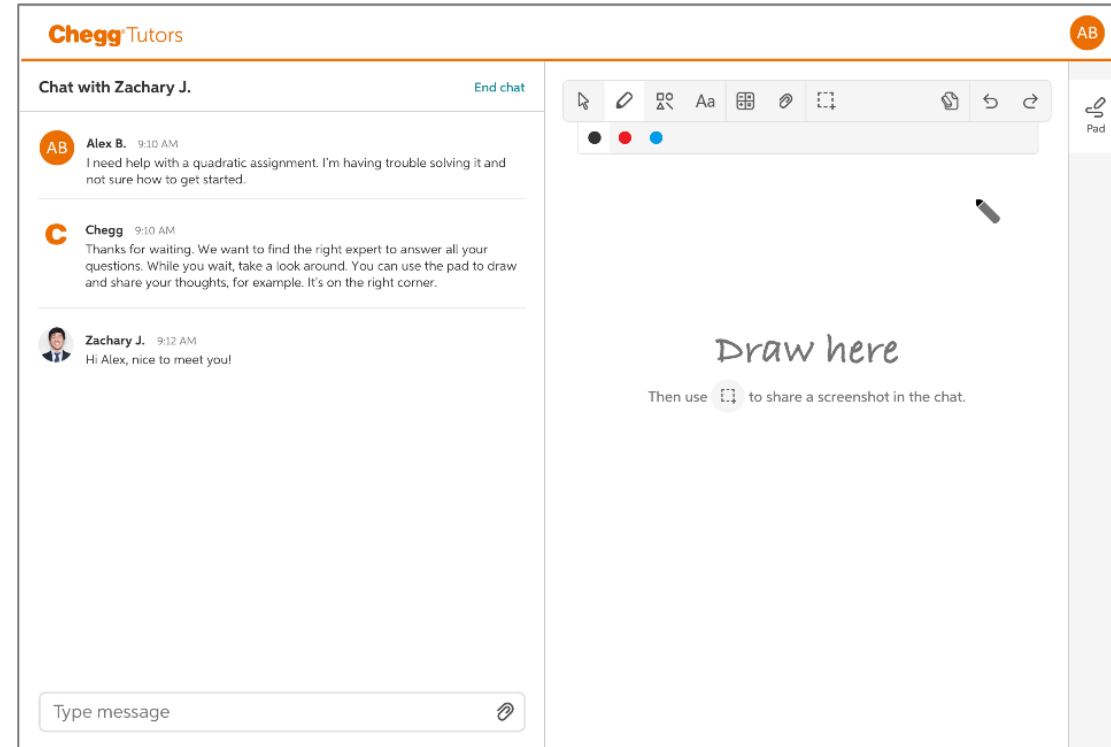
**Thus, students need to be informed how the scratchpad works and how to share/send images to the tutor**

**Prior onboarding messages\* may not be perceived by student**

- Observed students neglecting the message. Note this was before the message needed to force close.

**The severity of this misunderstanding is high!**

- If students assume this is the main space to share and show work, then this will cause miscommunication/disconnect between the tutor and student
- Furthermore, this will waste time and require the tutor to explain to students how to share information.



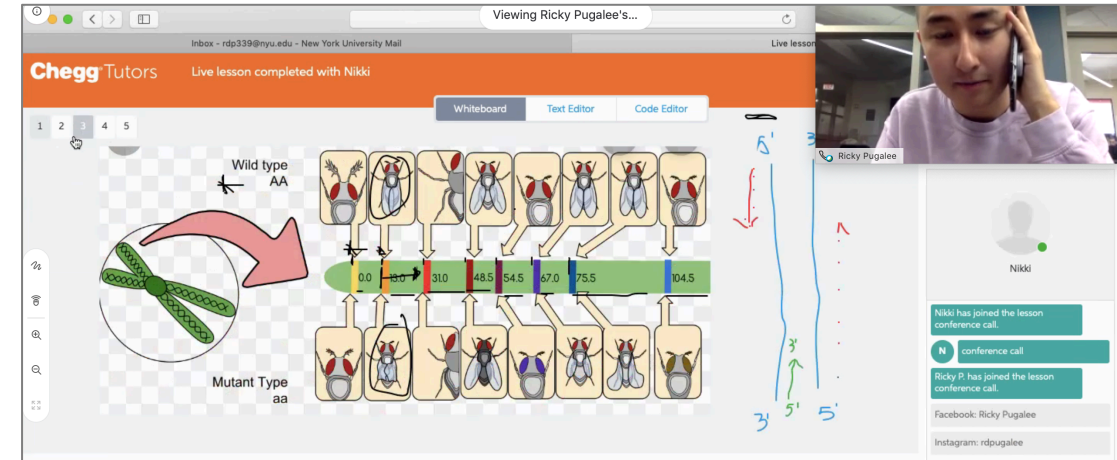


# Ability to keep an image concurrent with the chat

Images and figures are becoming more central to some of our expanded subjects like **Biology** and **Engineering**

Important to have the images/figures display constantly for reference

- Tutors were concerned that the CBLH console doesn't support ability for a student to have an image always displayed along with the chat.
- Perceived tediousness of the student trying to scroll through the chat thread to continuously find the image or have to continuously send the figure into the chat.



*“I use a lot of visualizations. I think Biology with pictures makes more sense.” P05*

*“I want them to see it throughout the lesson. Something to keep looking at. That is what the whiteboard is for something you are looking at together the whole time” P01*

# Scratch Pad Explorations

HOW MIGHT WE HELP STUDENTS UNDERSTAND HOW  
TO USE THE SCRATCH PAD?

# Variations Explored



**Version 1: Student draws image, crop function given after selecting “send to chat”, image remains on the scratch pad.**

# Variations Explored

Chat with Bob

chat. While you wait, take a look around! You can use the pad at the right to draw and share your thoughts, for example.

**Bob** 1:07 PM  
Hi Alice! I'm Bob, your tutor! I see you need some help with standard deviations, right?

**Alice** 1:07 PM  
test

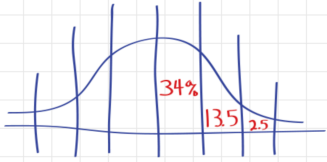
**Bob** 1:07 PM  
Great. Can you tell me what you already know?

**Alice** 1:07 PM  
test

**Bob** 1:07 PM  
Okay. Let's start by looking at a normal curve. Can you draw one for me?

Write your message here

Send to chat



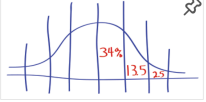
Chegg

Chat with Bob

**Bob** 11:19 AM  
Great. Can you tell me what you already know?

**Alice** 11:19 AM  
test

**Bob** 11:19 AM  
Okay. Let's start by looking at a normal curve. Can you draw one for me?

**Alice** 11:21 AM  


**Bob** 11:21 AM  
Beautiful! That's a great normal curve. Now, what can you tell me about those percentages?

Write your message here

**Version 2: Student draws image, image is sent directly after “send selection”, image clears from the scratch pad.**

# Asynchronous sharing misconceptions still existed

## Still expectations of synchronous live whiteboard

- The “send to chat” button interaction seemed to help. Those that understood the scratchpad, referenced the button as the key cue.
- However, the button wasn’t always seen. Some either did not notice or didn’t seem to process it as a next action.
- This led to some students still assuming a live synchronous whiteboard.

The screenshot shows a chat window titled "Chat with Bob" with a message history and a whiteboard on the right. The chat history includes:

- Bob 1:07 PM: Hi Alice! I'm Bob, your tutor! I see you need some help with standard deviations, right?
- Alice 1:07 PM: test
- Bob 1:07 PM: Great. Can you tell me what you already know?
- Alice 1:07 PM: test
- Bob 1:07 PM: Okay. Let's start by looking at a normal curve. Can you draw one for me?

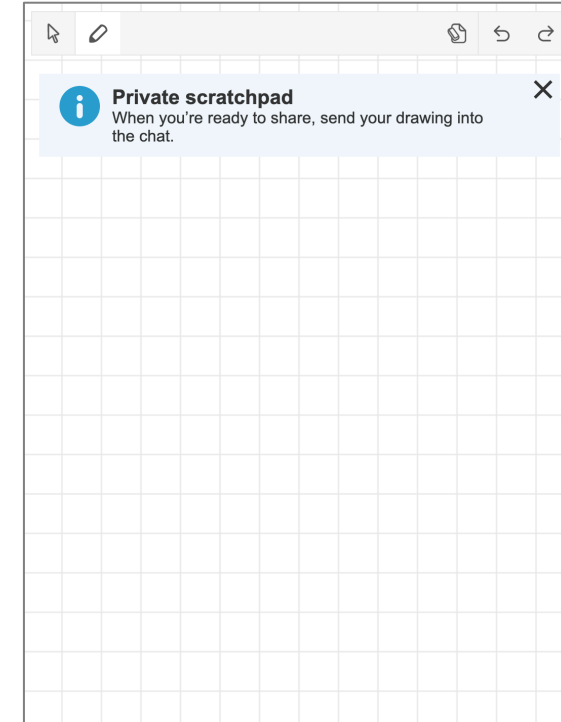
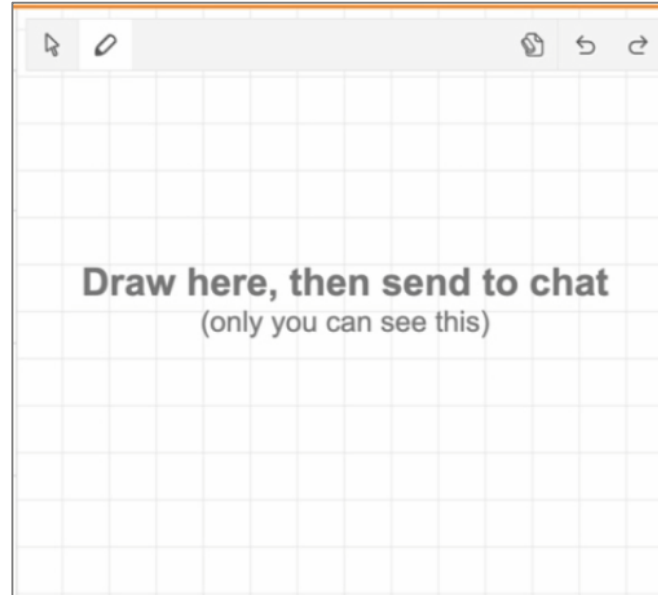
The whiteboard on the right displays a hand-drawn normal distribution curve. The area under the curve between two points is shaded and labeled "34%". The x-axis has two points marked with vertical lines, labeled "1.35" and "2.5".

At the bottom right of the whiteboard, a button labeled "Send to chat" is highlighted with a blue oval.

# Asynchronous sharing misconceptions still existed

## We can't rely on messaging alone

- We added message variations in round 2.
- Students mentioned not paying attention to the details of the messaging and assuming it was just telling them it was a writable area.
- For example P05 read “private scratchpad”, but didn't process it in the sense that it would not be visible to the tutor.



## Implications/Recommendations

- This problem seems to be an uphill battle as students have a strong mental model of a synchronous whiteboard.
- Design artifacts (“send to chat” button) seem to be more helpful as it starts to change the model, while the messaging can just be ignored or misperceived.
- Consider ways to make the “send to chat” button more discoverable

## Round 2: Messaging Variations

# Sending images

## Students were able to send images successfully

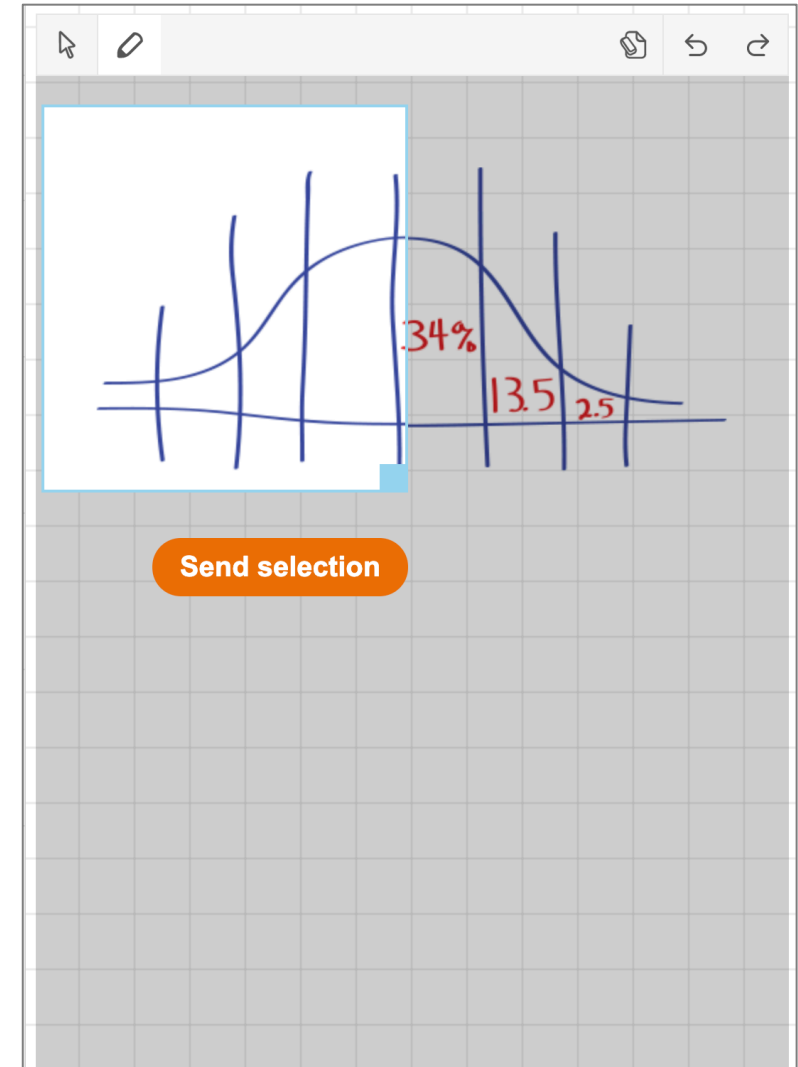
- Once prompted, students were able to effectively send their drawings to the tutor.

## Clipping as part of the process preferred

- Students liked the option to have clipping as part of the send process as it gave more specificity.

## Students wanted their image to retain

- Students liked to have their image retain on the scratchpad after sending.
- It was perceived as more efficient to erase the canvas than to have to redraw the image.



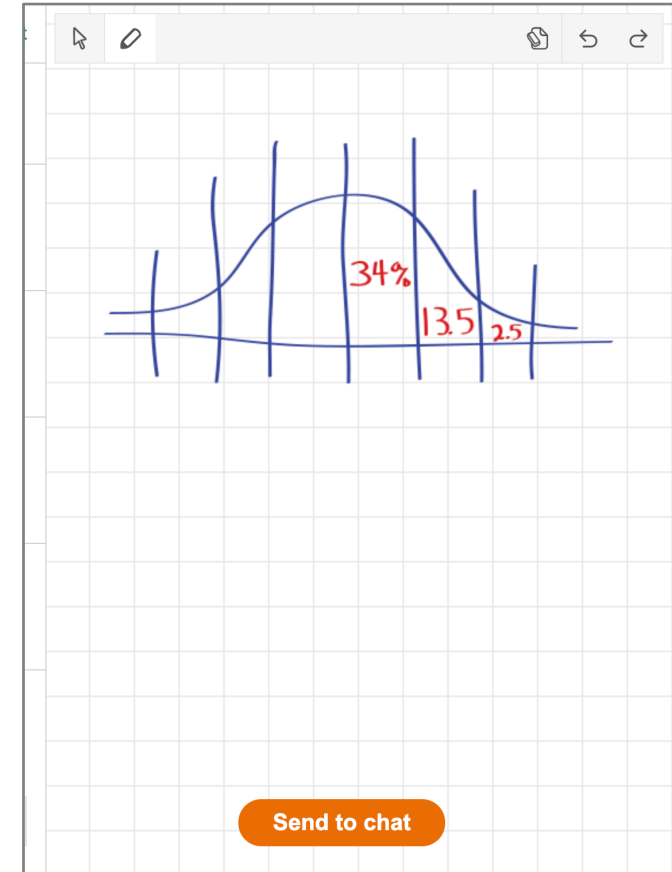
# Sending images

## Students appreciated the grid background

- Students liked having a grid background on the scratchpad for guidance and perhaps better drawing
- Students were mixed on if they wanted the grid to retain when sending the image over. While it could be helpful for context, they were uncertain how it would look as a thumbnail.

## However, most of the feedback was tied specially to this image

- Students seemed to hone their feedback specifically to the image shown in which the grid layout supported the graph and partitions well.
- It is unclear if these feelings would translate to non-graph images such as equations, figures, or conceptual images.



## Implications/Recommendations

- Incorporate “send to chat” button along with cropping.
- Consider allowing grid to be turned on or off as an option.




# Pinning Explorations

**HOW MIGHT WE ALLOW STUDENTS THE ABILITY TO  
TRACK AN IMAGE DURING A LESSON?**

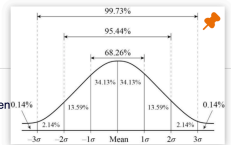
# Variations Explored

**Chegg**

Chat with Bob End chat

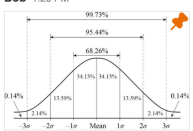


**Bob** 1:23 PM  
Beautiful! That's a great normal curve. Now, what can you tell me about those percentages?



**Alice** 1:23 PM  
test


**Bob** 1:23 PM



Let's look at a more detailed version of the normal curve.  
So,  
What do you notice about the percentages in this version?

Write your message here 📎

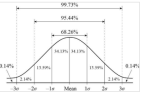
**Send to chat**



PIP Variation

**Chegg**

Chat with Bob End chat



So,  
What do you notice about the percentages in this version?

**Alice** 1:46 PM  
test

**Bob** 1:46 PM  
Right! The farther you get from the middle, the percentages get closer and closer to 0%, but they never quite reach it. Understand?

**Alice** 1:46 PM  
right

**Bob** 1:46 PM  
So, a standard deviation is a unit of how "abnormal" a point on the graph is. You see the points on the x-axis labeled 1 $\sigma$ , 2 $\sigma$ , etc?

Write your message here 📎

Top Window Variation

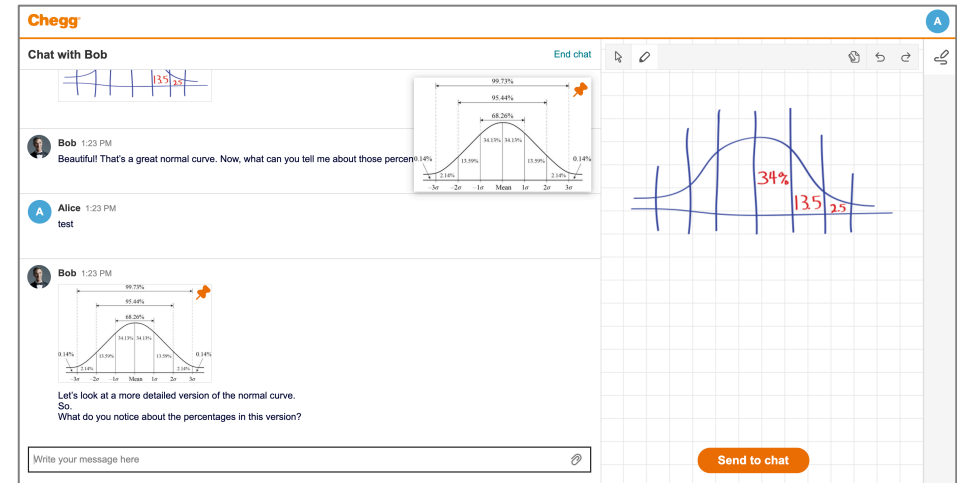
# Pinning

## Students liked the feature overall

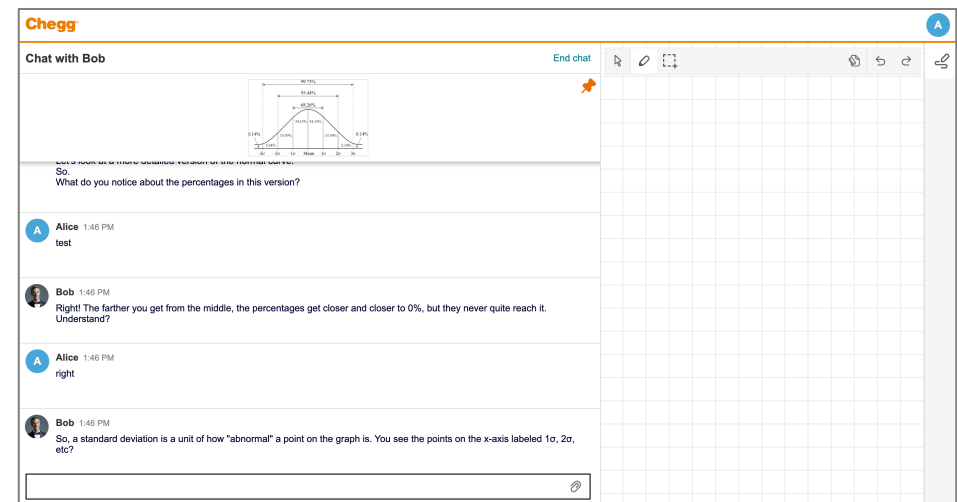
- In general students reacted positively to the feature, acknowledging the benefit of keeping an image in focus while chatting.

## “PIP Variation” preferred over “Top Window” variation

- The “Top Window” variation was perceived as more intrusive as it shortened the chat thread.
- For Round 2 we honed in specifically on this design.



PIP Variation



Top Window Variation

# Discoverability of Pinning

## Some students not attend to pinning

- Some students did not interact with the pin on their own.
- P05 did not notice the pinning icon.
- Others seemed so focused on the lesson conversation they did not think to explore the icon; even though it could have been of use as they scrolled up to refocus on an image.


## Not expected a PIP window

- In general, students weren't expecting a PIP window.
- P05 and P08 thought the icon to allow them to "save" the image for later.
- P06 thought it would dock the image to the side panel
- P09 thought it would copy the image to a clipboard.

## Students played with pinning once discovered

- Once discovered students seemed to naturally explore and played with the interactions.

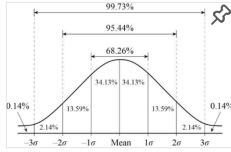
Chat with William End chat



**William** 11:19 AM  
Beautiful! That's a great normal curve. Now, what can you tell me about those percentages?

**Alice** 11:20 AM  
test

**William** 11:20 AM



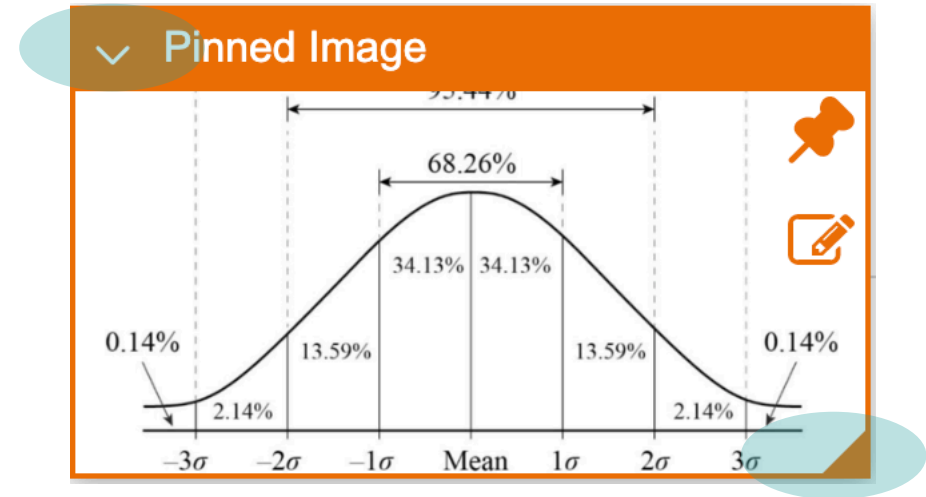
Let's look at a more detailed version of the normal curve.  
So,  
What do you notice about the percentages in this version?

# Student Requests

## Round 2 implemented student requests to easily move the PIP window out of the way

- Some asked for a ways to quickly minimize the window out of the way and bring it back.
- Some asked for ways to easily view a larger view of the image and see it side-by-side with the chat thread

## New features were easily discovered and manipulated



Min/Max and resize features added

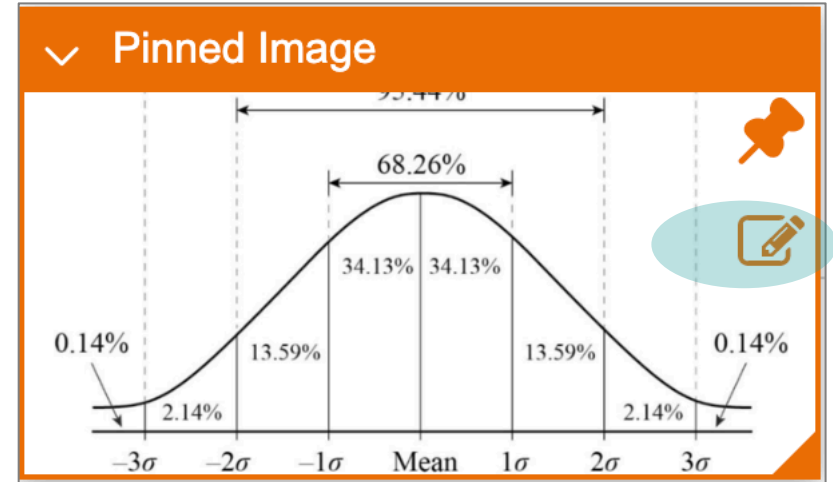
# Student Requests

## Round 2 implemented student requests to easily edit the images

- Some asked for ways to easily bring the image onto the scratch pad to further edit.

## Feature misunderstood

- Students seemed to perceive the feature as a way to draw on the image within the PIP and not necessarily import into the scratchpad.



# Student Requests

## Multiple images

- Students seemed to naturally assume pinning would support multiple images. Various interactions expected (e.g. multiple windows, tabs within the PIP).
- Some asked for ways to easily move between images in the chat thread. This especially came about when students thought about the tutor pinning and overriding their pinned image.

## Saving images

- Some wanted a way to save the pinned images to their computer.

The screenshot shows a chat window titled "Chat with Bob" on the Chegg platform. The chat history includes:

- Bob 1:23 PM:** Beautiful! That's a great normal curve. Now, what can you tell me about those percentages?
- Alice 1:23 PM:** test
- Bob 1:23 PM:** Let's look at a more detailed version of the normal curve. So, what do you notice about the percentages in this version?

The chat interface features a "Send to chat" button at the bottom right. On the right side of the chat window, there is a large grid area containing a hand-drawn normal distribution curve. The curve is annotated with vertical lines and percentages: 34% for the area between the mean and one standard deviation, and 13.5% for the area between the mean and two standard deviations. The mean is labeled as 13.5. The x-axis is marked with -3σ, -2σ, -1σ, Mean, 1σ, 2σ, and 3σ. The y-axis is marked with 0.14% at the tails. The chat area also displays several pinned images of normal distribution curves with similar annotations.

# Tutor pinning for students

## Students didn't seem to be confused when the tutor pinned

- In round 1, the tutor pinned an image for the student.
- Students didn't seem to think the tutor was pinning but instead that any image sent was automatically pinned.

## Tutors pinning did increase discoverability

- Once seeing the pin, students naturally explored the pin and its features.

## When asked, students were mixed on the idea of the tutor pinning

- Some didn't mind allowing a tutor to direct their attention.
- Those who were concerned, worried more about losing the image they pinned and wanted more control over what they focused on.

The screenshot shows a chat window titled "Chat with Bob" on the Chegg platform. The chat history includes:

- Bob 1:23 PM:** Beautiful! That's a great normal curve. Now, what can you tell me about those percentages?
- Alice 1:23 PM:** test
- Bob 1:23 PM:** Let's look at a more detailed version of the normal curve. So. What do you notice about the percentages in this version?

The chat interface features a "Send to chat" button at the bottom right. A pinned image is visible, showing a normal distribution curve with the following data points:

Interval	Percentage
Between $-3\sigma$ and $-2\sigma$	0.14%
Between $-2\sigma$ and $-1\sigma$	13.99%
Between $-1\sigma$ and Mean	34.13%
Between Mean and $1\sigma$	34.13%
Between $1\sigma$ and $2\sigma$	13.99%
Between $2\sigma$ and $3\sigma$	2.14%
Between $3\sigma$ and $2\sigma$	0.14%
Between $2\sigma$ and $1\sigma$	95.44%
Between $1\sigma$ and $-1\sigma$	68.26%
Between $-1\sigma$ and $-3\sigma$	99.73%

A handwritten note in red on the right side of the chat window reads: "34% 13.5 2.5".



## Implications/Recommendations

- The pinning feature is valued by students and we should consider adding the feature as a way to help with upcoming subjects which are more visually focused like Biology and Engineering.
- Move forward with the PIP variation and features to easily move the image out of the way (min/max, resize, etc).
- Students seemed to be attending to the conversation such that they may miss the pinning feature. How might we showcase this feature which students enjoy?
  - Some ideas
    - Allow the first item that a tutors sends over to be automatically pinned.
    - Play with the iconography to further suggest a PIP window.
- Explore further ways to allow students to view/transition through multiple pins.
- Allowing the tutor to pin could be useful, but may require additional control features from the student such as confirmation/allowing the tutor to pin or having features to allow students to easily view/transition through multiple pins.

# Thank you