

Preparation Notes

Please review and customize this deck to prepare it for use. Some notes:

- These professional learning (PL) materials (slide deck and accompanying handout) are being offered in editable forms so that you may make adjustments to better support the specific work happening in your school or district.
- For the 2024–25 school year, student work samples are not provided for most sessions. The facilitator will need to collect or create student work samples when implementing these materials during 2024–25.
- These PL materials are designed to easily accommodate remote delivery:
 - A [Jamboard template](#) is provided to facilitate discussion of student work; the facilitator will need to make a copy of this and be ready to share the link with participants as noted in the deck.
 - Text that can be readily pasted (marked with “—”) into a video call chat feature is included when participants need to reference the handout.
 - There are placeholders for handout links to be shared with participants in the notes field of selected slides; the facilitator will need to add a link to the handout where indicated by “[insert link].”

M215 Overview

**XQ Badge Project PL Series Baseline
Session**

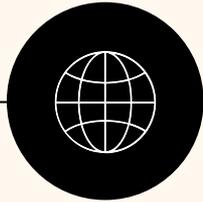
Insert date



Community Building

Create a slide with pictures, photos, and/or words that describe you as an educator.

Outcomes and Agenda



Participants will be able to:

- Explain the content and practice expectations for the M215 badge
- Analyze tasks through the lenses of (1) content and practice expectations and (2) learning principles
- Analyze student work for evidence of learning

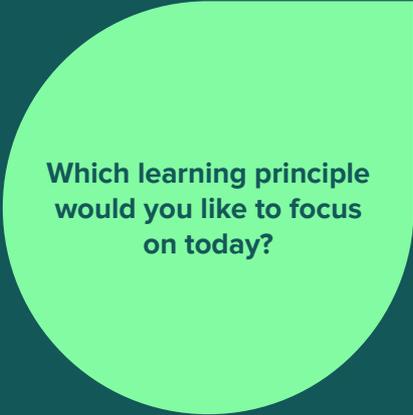


Agenda:

- Exploring the Content
- Task 1: Expectations and Learning Principles
- Task 1: Student Work
- Task 2: Expectations and Learning Principles
- Task 2: Student Work
- Closing

Learning Principles

1. Engage with cognitively demanding tasks in heterogeneous settings.
2. Engage in social activities.
3. Build conceptual understanding through reasoning.
4. Have agency in their learning.
5. View mathematics as a human endeavor across centuries.
6. See mathematics as relevant.
7. Employ technology as a tool for problem-solving and understanding.



**Which learning principle
would you like to focus
on today?**

01

Exploring the Content

What comes to mind?
What knowledge and skills
should students learn to
earn this badge?



**Come off mute
or put your
thoughts in the
chat!**

What's the Story of these Standards?

Selected Common Core Standards for Mathematics – Making Inferences and Making Conclusions

Understand and evaluate random processes underlying statistical experiments

1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?

Make inferences and justify conclusions from sample surveys, experiments, and observational studies

3. Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
4. Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.
6. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.

**How would you synthesize these?
What are the key takeaways
for students in 2–3 sentences?**

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Share your thinking!

M215 Content and Practice Expectations (CPE)

215.a	Use probability distributions to calculate p-values and interpret these p-values in context.
215.b	Use probability distributions to calculate confidence intervals in order to estimate population parameters and interpret these confidence intervals in context.
215.c	Conduct informal inference testing for quantitative and categorical data.
215.d	Use bootstrapping to estimate population parameters.
215.e	Make appropriate conclusions about study results using aspects of the study design.

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**Put in the chat:
Which ideas
connect to
what your
group came up
with?**

M215 Content and Practice Expectations and Indicators

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**What new
insights do you
have?**

Let's Investigate

Choose at least one task to explore:

- EPA Regulations
- Political Polling

Which content and practice expectations are evident in each one?

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**Come off mute
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thoughts in the
chat! What did
you find?**

What's the Same?

What's Different?

1. How do these content and practice expectations align to ways you've taught this topic before?
2. How are they different?

**Come off mute
or put your
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Inequity Is our Reality

About

60%

of community college students and 40 percent of four-year students are placed into non-credit bearing developmental mathematics (Ganga et al., 2018)

Only

33%

of community college students complete the developmental math sequence. Only 20 percent complete a college-level math course over three years (Bailey, Jeong, & Cho, 2010).

We Must Lead the Movement

How can this approach give space for what math can be?

Is math...?

- About getting one right answer, the teacher's way
- Irrelevant
- About doing procedures
- Independent work
- Something my teacher made up
- Formulaic

Or could math be...?

- About using multiple strategies flexibly
- Connected to the real-world in ways that make sense
- About understanding and applying
- Collaborative work
- Lived across continents and centuries
- Novel, challenging problems

02

Task 1: Expectations and Learning Principles

Let's Do Some Math!

In this activity, you will use the applet at www.tinyurl.com/appletCI to learn what it means to say we are “95% confident” that our confidence interval captures the true proportion. Set the population proportion to 0.5, the confidence level to 95%, and the sample size to 75. Click “Sample” to choose a simple random sample and display the resulting confidence interval. The confidence interval is displayed as a horizontal line segment with a dot representing the sample proportion in the middle of the interval. The true proportion (p) is the green vertical line.

- Did the first confidence interval capture the true proportion?
- Repeat this 10 times. How many of the intervals capture the true proportion?

With a partner, explore this applet by generating many confidence intervals for different confidence levels, then again for different sample sizes. Use the “Sample 25” button to generate many confidence intervals at once.

Do the task as a student would. Jot down any reflections that you have as you do the math!

Content and Practice Expectations

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Choose 1–2 Content and Practice Expectations that student work could give evidence of.

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215.b: Use probability distributions to calculate confidence intervals in order to estimate population parameters and interpret these confidence intervals in context.

Learning Principles

In M215 Inference and Making Conclusions, students will employ the following learning principles:

- Engage with cognitively demanding tasks in heterogeneous settings (LP 1).
- Engage in social activities (LP 2).
- Build conceptual understanding through reasoning (LP 3).
- Have agency in their learning (LP 4).
- View mathematics as a human endeavor across centuries (LP 5).
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Which of these principles does this task lend itself to? Which ones can the task be easily adapted to accommodate?

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**Share what
you came up
with!**

03

Task 1: Student Work

ASSET-BASED LANGUAGE

- Focuses on the strengths that a student brings to the learning community
- Views diversity in thought, culture, and traits as positive assets
- Is opportunity focused
- Signals the need to change the system to meet the needs and gifts of the student

DEFICIT-BASED LANGUAGE

- Focuses on what a student is lacking
- Conveys what is missing that must be found/fixed
- Is needs/problem focused
- Leads educators to make assumptions about what a student may know and can do
- Implies the student must change to fit the system

[T]erms are never neutral [...]; language, orientation, and definitions have the power to impact human relationships, identity, and academic success.

(Lu and Webster 84)

Round 1: What do you notice?

What do you notice?

- Jot down at least one thing you notice about this piece of student work.



**Come off
mute or
share in the
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Humanizing Assessment

Grading echoes the economic framework of testing, presuming that we can encapsulate learning in a number or a letter. Street data reminds us that our primary task as educators is to provide regular feedback to students so they can grow, not to evaluate them in order to anoint them academically capable or not. (Safir and Dugan, 2021, p. 135)

Source: Safir, Shane, and Jamila Dugan. *Street Data: A Next-Generation Model for Equity, Pedagogy, and School Transformation*. Corwin, 2021.

Criteria for Success

Conference and Provide Revision Support	Accept with Revision	Accept
<p>The student's artifact shows an emerging understanding of the expectations of the indicator(s). After conferencing and additional instruction/learning, the student may provide a revised or different artifact as evidence of the indicator(s).</p>	<p>The student's artifact is approaching a full understanding of the expectations of the indicator(s). The artifact may contain execution errors that should be corrected in revision. The student may revise the selected artifact or submit a different artifact.</p>	<p>The student's artifact demonstrates evidence that they have met the expectations of the indicator(s).</p>

What resonates with you? What questions surface for you?

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Round 2: What evidence of learning is there?

215.b: Use probability distributions to calculate confidence intervals in order to estimate population parameters and interpret these confidence intervals in context.

Let's examine some work together:

Conference and Provide Revision Support

The student's artifact shows evidence of an emerging understanding of the expectations of the indicator(s). After conferencing and additional instruction/learning, the student may provide a revised or different artifact as evidence of the indicator(s).

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The student's artifact demonstrates evidence that they have met the expectations of the indicator(s).

Examining Student Work

The image shows a digital workspace interface for reviewing student work. At the top, there are three buttons: "Conference and Provide Revision Support", "Accept with Revision", and "Accept". On the left side, there is a vertical toolbar with several icons: a pencil, an eraser, a mouse cursor, a document icon (highlighted with a red circle and a red arrow), a photo icon, a circle icon, a text box icon, and a scissors icon. In the center of the workspace, there is a large red callout bubble with the text "Put your thoughts on the Jamboard!". In the bottom right corner, there is a red circular badge with the text "Work Sample 1".

Example #1



**Let's compare
notes.**

Example #2



**Let's compare
notes.**

Example #3



**Let's compare
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04

Task 2: Expectations and Learning Principles

Let's Do Some Math!

Task 2: Joy Milne's Story

Part 1: Joy Milne's Story

Take a couple of minutes to watch [this video about Joy Milne](#). What questions surface for you as you listen to her story?

Part 2: A Simulation

Let's investigate whether Joy's result could have happened purely by chance, just by guessing. Working in pairs, you will simulate this study. One person will be the experimenter and one person will be Joy; then you will switch.

Important: the experimenter should not reveal the truth for each shirt. They should simply record whether the guess was correct or incorrect.

As the experimenter, keep track of the results:

Correct	Incorrect

Count up the number of correct decisions. Write the number on a sticker dot and bring it to the dotplot poster at the front of the room. Discuss with your partner what you notice and wonder about the class dotplot.

Part 3: Reflecting on this experience During the class discussion, two terms were introduced: *p-value* and *significance level*.

1. What do these things mean? Use examples from Milne's story and the class experiment to illustrate.
2. Why are these two ideas, *p-value* and *significance level*, important?

Do the task as a student would. Jot down any reflections that you have as you do the math!

Content and Practice Expectations

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Our goal: understand student thinking so we can help to move it forward!

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Notes**

Example #2

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Example #3



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Notes**

06

Closing

Closing Discussion

Consider:

- What is next for you with M215 or other badges?
- What questions linger for you?
- What further support would you like to see?