Ali   Plus: clear gaps that need attention Delta: What will you do to further this work? Who is your population that you are trying to impact

Ali (+NE)   Plus: I really like the change you made to focus on computer science education. This is a subject that is lacking in both female and students of color. Look into programs such as girls who code! I'm not sure if there are programs focused towards multi-cultural students, but it would be interesting to find out.   Delta: How are you going to advertise/get students interested in attending these after school computer science programs?

Ali (Erik)   Plus: Awesome focus on gender and ethnicity. Cool to see a focus one a specific STEM field in a specific region as well. Getting a lot of details there might even speak better to what's happening in other fields than doing a broader, more generic analysis.   Delta: After you come to your conclusion, it would be a cool "too be continued" tone to repeat the first step of your CE3 in regard to another STEM field.

Ali (pt)Plus: You will switch to work on computer science disparities and learn computer science yourself.   Delta: Is there a way to think in computer scientific terms without being trained in a specific computer science language, which may be superseded by the time your students get on to high school and saw.

Ali CE3 (CQ) Plus: I liked the progression - your headers are a great way of structuring the flow of your ideas.   Delta: You didn't mention during your presentation who the target audience is for this product - I would be curious to see how you will either a) hone in on a particular demographic to reach (education sector?) or b) make this relevant and non-jargon for everyone.

Andrew   Plus: application of qualitative assessment of outcomes   Delta: reminds me of the coding step in qualitative data analysis

Andrew (+NE)   Plus: I like the idea of your CE. Being able to bring large amounts of data or other quantitative information and making it understandable to you or a certain audience. This can make math more obtainable for a lot of people.   Delta: I am still a bit confused on the initial explanation of objectives and key results, but I'm sure being able to read your full CE will help clarify this more.

Andrew (Erik)Plus: Objectives and Key Results is a really cool approach.   Delta: The word "simple" was mentioned a lot leading up to your description, so would only recommend a disclaimer that the description might be a little more complex. Or find a way to deliver the idea that sounds simple?

Andrew (pt)   Plus: your definition of mathematical thinking   Delta: you might think about ways of being systematic but not quantitative in taking stock so as to improve. (See p. 55ff in http://scholarworks.umb.edu/cgi/viewcontent.cgi?article=1112&context=cct_capstone)

Andrew CE3 (CQ)   Plus: I like your first slide wording - great takeaway from the course!
        Delta: It would be interesting to see how teachers respond to this too (you talk about student satisfaction) - would love to consider how shifts would impact them too.

Andrew WIP (by AOD)   Plus: Morphing qualitative investigations into quantitative methodologies is so applicable... even before you began giving examples my mind was thinking about how applicable/expandable your idea is to the general public.Delta: How can you make others buy into your idea? Will you be able to make your practices sustainable?

Brad   Plus: I thought it was really interesting to see an arc that was consistent from CE1 to now, CE3.   Delta: I'm really interested to know more about the idea of mathematical thinking in terms of it's impacrt on curriculum development in your science classroom.

Brad (+NE)   Plus: I like the set-up/design you have made for your CE3. How it will be your curriculum/syllabus for the year. This could be very helpful to fellow biology teachers, because they could use your syllabus as a guide as well.   Delta: "Expand on the graphs that you make with your students. Like Peter has introduced to us, have them create the graphs and understand/determine which part of the equation or problem goes where in the graph.   Also I am interested in learning more about your collaboration with the math teachers in your buildings. Whether that is creating your syllabus together or picking certain days of the month where you work on projects with the students."

Brad (Erik)   Plus: The interdisciplinary perspective is so great! Looks like rich terrain to explore! The link between the scientific approach and mathematical thinking is something that is going to help me.   Delta: I honestly think you have a lot in front of you to chew on and it all looks promising. Press on friend.

Brad (pt)   Plus: "the sequence of development from CE 1 to 2 to 3. The three manifesto themes."   Delta: I wonder if teacher collaboration would be easier once the math teachers see that you're doing what fits under the first manifesto theme, I think – the one in which you are being systematic about the way biological thinking is supported by mathematical thinking.

Brad CE3 (CQ)   Plus: You are asking good, meaningful questions to guide your work. Slide 2 gave me lots of food for thought.   Delta: Your idea that biological thinking is supported by mathematical thinking (and not vice versa) made me want to challenge that (although I know you were speaking in terms of your Bio class) - in what ways can various disciplines or ways of thinking/knowing influence each other? How could your thoughts in CE3, for example, influence a math teacher to incorporate some biology?

Brad WIP (by AOD) Plus: It seems like you are truly hoping to change the way you approach teaching!   Delta: Your final question on Theme #3: And what about technology? is a great area to think about. Can your manifesto be applicable to all schools? What alterations should be kept in mind for school sites that may have higher or lower numbers of resources?

Caitlin Plus: Reminds me of Bronfenbrenner's ecological systems model but edited for math thinking   Delta: doesn't a manifesto impact anyone that reads/sees it? especially if it comes from an authoritative source. how far does F2F vs. online extend into the outer layers?

Caitlin Plus: I think the visal made a lot of sense and really gave me an idea of where you're headed as we finish out CE3 Delta: I'm interested in the way you imagine this being applicable across age groups.

Caitlin (+NE) Plus: I like that you are going to focus on the influence society has on decreasing students mathematical thinking. That girl or boy could have been put down their whole life or said that they couldn't handle it, causing them to not think they could do it.   Delta: I'm not sure how much research you have done on this already, but maybe look into psychological tests that have been done on kids to see if their home influences are affecting how they learn in school.

Caitlin (erik) Plus: Really enjoyed the visual representation. Also, creating cognitive space for mathematical and non-mathematical thinking is very intriguing. Delta: I wonder about the compartmentalization of thinking. How possible is it, and to what extent?

Caitlin (pt)   Plus: The shift from what individuals can do to improve to what society can do to support people to improve. Delta: You might look at the social forces that support people avoiding systematic thinking, which includes mathematical thinking. Once you identify these, you don't have to work out how to resist them.

Caitlin WIP (by AOD)   Plus: Your graphic is broad enough to be applied to all areas of mathematical thinking, yet specific enough to provide guidance to all ages.Delta: What a great question... what constitutes no mathematical thinking? I can't think of anything... the question itself is a great way to help the realization of permeation of mathematical thinking. Also, just a personal thought- 'parents' may not be as inclusive as 'families'... our school has a high percentage of family members outside of mothers or fathers being the primary caregiver to students.

Erik   Plus: The themes you've been pursueing this semester have remained consistent, but it's interesting to hear the growth you've made in your thinking.   Delta: I'm eager to hear about what come up in the research, specifically around some of these questions of identity.

Erik   Plus: holistic educational approach, interconnectedness of things Delta: interested to see it all tie together

Erik (+NE)   Plus: I like the incorporation of different cultures and locations around the world and how they are being successful in mathematical thinking. Delta: I am not sure if you are still going to try and incorporate the video game pedagogy into your CE 3? It might not be needed with the incorporation of the cultural aspect and how this can affect students in classrooms. Maybe if you want to, focus on the idea of the avatar and how they can create their ultimate character and relate that to how they would like to be treated in the classroom.

Erik (pt)   Plus: Your definition.   Delta: "A mathematical example of the last slide in which you are exploring a new space. It is important, I think, to address cases where the person's views get in the way of additional thinking. The private universe videos from the Annenberg condition address the way students come to learning with a private universe, at least in science. A more general case of culture getting in the way of learning is captured in the classic book of Paul Willis, learning to labor, which has a subtitle, how working class kids get working-class jobs."

Erik CE3 (CQ)   Plus: I like the integration of concepts like empathy into your ideas.   Delta: Perhaps defining some of your terms will help create common language/understanding.

Erik WIP (by AOD)   Plus: GENTLE CHANGE- what a great term to encompass empathetic dialogue, etc. The emulsion of old and new ways may indeed allow for lessening of hostility.   Delta: When speaking about 'voice' in cultural change, you mentioned the notion of being wrong, agency, and action. What do you mean in that regard?

Nadjia Plus: I love the idea of action human focused action, a great message for people who are eager to help, but who've maybe not considered ways they can be maximally helpful. Delta: Looking at the list of skills for engineers, I felt a little overwhelmed, so many different skills! I wonder if you could address specifically how one might aquire and become conversant in such a wide array of skills. Does this inadvertently lead to a diffusion of mastery of the core engineering skills?

Nadjia Plus: SAL   Delta:

Nadjia (Erik) Plus: So interesting the social perspective you have on these engineering projects. Also fun how your are aware of it and looking at where it's more or less appropriate.   Delta: I'm not sure if I just got distracted or what happened, but I was a little unclear at the end of where you were going, or I was waiting for a clarification that didn't arrive. But I could have just missed it.

Nadjia (pt)   Plus: "The idea of a guidebook for young engineers interested in projects of international development. Doing a survey to get input from others."   Delta: "You might look at the classic work of Hassan Fathy, who was asked to design a new village in Egypt during the 1940s. Not everything worked out, but many social and health problems were addressed creatively. https://vimeo.com/15514401 some of the quantitative skills that might be included in your body of knowledge might include back of the envelope calculation or estimations. look for a book called something like beyond a spherical cow by John Harte and others."

Nadjia CE3 (CQ)   Plus: I really like your focus and theme - very relevant - and I know a lot of people who would be interested in this!   Delta: I wonder if you could organize a 4th section on that ideation-implementation etc. slide....of "iteration". Getting feedback, redesigning, making shifts, etc....

Nadjia WIP (by AOD)   Plus: Great encompassing, clear plan for introductory engineering. I also appreciated the global applications, as so many of our projects are locally-focused.   Delta: Are there any other specific mathematical thinking pathways to prepare global youth for your handbook? For example, are you targeting US students to work abroad, or students who are abroad to support their own countries? If a country is lacking basic resources for education, what other steps can be taken prior to introducing your handbook?