**MTE Facilitation Guide for the Task-Based Interview Module**

PREPARATION

* The Interview Module can be implemented at any time during the semester and does not assume PSTs have any prerequisite experiences. As such we recommend it be done fairly early in the semester to potentially lay a foundation for continued engagement with these ideas.
* In advance of starting the module, alert the pre-service teachers (PSTs) that they need to find a student to interview who is between 8th and 12th grade, has successfully completed Algebra, and is willing to verbalize their thinking process.
* Obtain the following articles for distribution to the PSTs:
1. Herbal-Eisenmann, B. A., & Breyfogle, M. L. (2005). Questioning Our Patterns of Questioning. *Mathematics Teaching in the Middle School*, *10*(9), 484-489.
2. Huntley, M. A., Marcus, R., Kahan, J., & Miller, J. L. (2007). Investigating high-school students’ reasoning strategies when they solve linear equations. *The Journal of Mathematical Behavior*, *26*(2), 115-139.
* General time frame for module:

Week 1:  pre-assessment, interview assignment launch and discussion;

Week 3:  interview assignment due, whole class discussion;

Week 4:  return interview assignment (with feedback and grade), do in-class responding assignment and assign take-home responding assignment for homework;

Week 5: post-assessment.

PRE-ASSESSMENT

* The pre-assessment together with the post-assessment can provide valuable information to the MTE regarding the PSTs’ noticing skills. Suggest using them for formative assessment.
* Should take 30 minutes total. Limit PSTs to 15 minutes total for the written responses.
* Administer the pre-assessment before distributing the interview assignment. This can be during the same class period or one class period prior.
* *Distribute the handout* (Word document “Pre-post video assessment”). This should be copied as separate pages. You may choose to only collect the second page.
* *Provide a brief explanation of the context for the video:*

The student just completed 7th grade where she took Algebra I.

Here are the tasks the student is given to complete:

1. Solve for $x$: $x^{2}-4x+4=0$.
2. Could you solve that another way?
3. Solve for $x$: $x^{2}-2x+3=0$.
4. When you look at those two, what would the graph of this (interviewer points to task 1) look like?
* *Do the math:*

Give the PSTs 6 minutes to solve the tasks themselves. Then have a brief discussion of the correct “answers” so PSTs can focus on the student thinking in the video without trying to make sense of the problem and solve for themselves at the same time.

* *Distribute copies of the student work* (pdf file Student Work from videos) *and the video transcript* (word doc E quad video transcript)

* *Watch the video E quad once. Then instruct the PSTs to answer the first prompt*

1.     As you watch this video, what do you notice?

* *Watch the video E quad a second time. Then instruct the PSTs to answer the next two prompts*

2.     How would you describe what this student understands?

3.     Describe some ways you might respond to this student and explain why you chose those responses.

* *Collect the student papers*.
* *PSTs can share in a class discussion what they noticed.* PSTs often have questions about the interview they just watched. Here are some common questions and the suggested responses the MTE can give.

**Pre- and Post- Assessment Potential Student Questions and Responses**

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| **Question** | **MTE response** |
| What math classes have the students in the videos completed? | E: 7th grade AlgebraS: 10th grade Algebra 2 |
| How old are the students? | We don’t know. |
| What math classes are they in now? | This was filmed between courses. |
| Where are the students from? | Somewhere in the Midwest. |
| Was the interviewer their teacher? | No, but she is a math teacher. |
| Why didn’t the students use a calculator? | The problems didn’t require them (simple computations). |
| Are these students on track, gifted, or normal? | We don’t know. |
| Why were these problems chosen? | They address learning goals aligned with the Common Core State Standards for Mathematics (CCSS-M) for all students. |
| Are complex numbers taught in Algebra 1? | Not usually. So, we can assume no. |
| Why did she ask them to draw a graph? | This is an understanding all students should have according to the CCSS-M. |
| Should we only write what we notice about the math or the teacher or other things. | Write about anything you notice. |
| I don’t know what the student was doing in the video with the table. | She was using a table to find factors. This is a commonly taught approach. |
| How should we respond to the question 2? As a teacher or interviewer? | Teacher of the student. |
| I didn’t like…and was distracted by…. | Feel free to write that in what you noticed. |
| Any other question? | We don’t know. [If not possible, then document the question and your response.] |

INTERVIEW ASSIGNMENT LAUNCH AND DISCUSSION

* This can be done immediately following the pre-assessment or the following class period.
* Suggest giving PSTs 2 weeks to complete the interview assignment from the day it is launched in class.
* *Distribute handout of interview assignment* (Word document “Solving equations student interview assignment”). Option to post on course website & refer to it with it displayed on screen.
* *Launch* the assignment by highlighting the following portions of the written description: all of page 1, supplies (top of page 2), paper description (page 5). Tell the PSTs to read the entire interview assignment description carefully and contact you with questions.
* *Discuss how to elicit student thinking through questioning*
* This should be done after the interview assignment has been launched (during the same class period or the following one).
* The purpose of this discussion is to prepare PSTs for successful execution of the student interview where they elicit the thinking of the student interviewee.
* *Distribute* copies of the article “Questioning our Patterns of Questioning”.
* Have the PSTs read out loud in turn the scenarios in example 1, example2, and example 2 revised to bring out the differences in IRF, funnel, & focus questioning patterns. Highlight the meaning of each questioning pattern and differences between them in a discussion. Also identify potential benefits and weaknesses of each questioning pattern.
* Highlight that in the interview they do with the student, they should aim to use a focusing interaction pattern with a goal of eliciting student thinking, not teaching the student.
* *Assign* the reading of the whole article for homework.

INTERVIEW ASSIGNMENT DISCUSSION

* In the first class session after the interview assignment is due, the MTE will lead a discussion of the experience of doing the assignment. Class discussion will focus on PSTs sharing experiences. Expected time for discussion is approximately 20 minutes.
* *Suggested discussion prompts*:
* Did any of your students get everything right? If not, what were they struggling with?
* What did you learn about student thinking from doing this assignment?
* How did you do at using questions to elicit student thinking? What were you able to do well, and what did you struggle with? Were you able to avoid leading questions? Were you able to avoid telling the student how to answer?
* Make sure to *discuss the power of solving equations graphically*. The idea that no matter what the equation is, we can graph each side of the equation and see where the graphs intersect to solve the equation is powerful. The same cannot be said for solving algebraically. For example, one can easily solve the equation x2-6x+2 = .5x by graphing but it is not solvable algebraically. See the article, “Student understanding of the Cartesian connection: An exploratory study.” (Knuth, 2000) for more information on this topic.
* *Assign* reading the article “Investigating High School Students’ Reasoning Strategies When They Solve Linear Equations” for homework. This will provide the PSTs with information about a bigger study that was done with students completing the same interview protocol they used. It also supports their learning about research on students' mathematical development when learning to solve equations like those used in the interview, which will be relevant to the upcoming responding portions of the module.

RESPONDING ASSIGNMENTS

* Following PSTs receiving their grades and feedback on the interview assignment, you will move to work on developing their ability to respond to student thinking. There are two assignments related to this: an in-class responding assignment and a take-home responding assignment. The in-class responding assignment must be completed before the take-home responding assignment.

In-Class Responding Assignment (Estimated time to complete 75-90 minutes)

* *Organize the class in small groups* (3-4 PSTs each).
* *Distribute handout* *of in-class responding assignment* (Word doc In Class Responding Assignment)
* *PSTs work (in their groups) through questions 1 and 2* then MTE facilitates a *discussion*.
* Question 1 is meant to motive and transition from the student interview they conducted, where they were only to elicit and interpret the student thinking, to the current work on responding to student thinking
* Bring out that Taio’s statement alone makes it unclear whether or not Taio understands that this equation has an infinite number of solutions.
* Discuss clarifying questions (top of next page), including their usefulness when you need to know more about how a student was thinking and the suggested questions provided
* Transition to a *discussion of responding* (page 3 of handout). Discuss and clarify the four criteria of a good response (page 3 on the in class assignment sheet). Connect that back to the work for question 2.
* PSTS do as directed in *question 3 with their small group*.
* If you have time, PSTs could add additional questions they come up with.
* Give PSTs *individual time to answer questions 4 and 5*.
* Facilitate a *whole class discussion* of their answers to questions 4 and 5. Have PSTs give examples of how they responded to student thinking and connect that to the characteristics of a good response.
* This is their first time doing this, so expect the PSTs to struggle a bit. It’s important to set a classroom culture where it is okay to share ideas that are not perfect, but beginnings for discussion.
* PSTs often want to tell Taio how to interpret the statement 8 = 8. Guide them away from this, as it doesn’t meet characteristics 3 or 4.
* If a response to Taio involves having Taio graph both sides of the equation to realize they are the same expression and therefore the original equation has an infinite number of solutions, make sure the response then circles back to Taio’s written work to have Taio consider how she could have come to that conclusion from her symbolic work.
* In small groups, have PSTs *complete question 6*. To save time, you can assign each small group one of the students to complete (Teresa, Daniel, or Brendan) rather than all three. To foster later discussion, it is useful if more than one group does each student. If students are struggling to come up with a response, ask them to consider whether an alternate task (possibly involving another representation) or digging deeper into the work the student has provided through a discussion with the student would be productive.
* Lead a *whole class discussion to complete question 7*.
* Evaluate effectiveness of the suggested responses using the four characteristics of a good response.

Take-home Responding Assignment

* *Assign Take-Home Responding Assignment* for homework (Word doc Take home responding assignment). Suggest allowing 1 week for PSTs to complete it.
* A *scoring guide* (Word doc Scoring Guide for responding assignment) is available. It describes what the response for each student should include in order to meet the 4 characteristics of a good response.

POST-ASSESSMENT

* The post-assessment should be given after the PSTs have completed the Take Home Responding Assignment.
* The post-assessment follows the same procedures as the pre-assessment, except for viewing a different student interview. The post-assessment will use the student interview video S quad (edited version).