National Academy of Sciences workshop on Literacy for Science and Science for Literacy.

Science and literacy in teacher education: What do novices need to know and be able to do?

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QUESTIONS TO ADDRESS

- What do novice teachers need to know and be able to do for literacy for science?
- What can teacher education do to support the development of that knowledge and practice?

Q1: WHAT DO NOVICES NEED TO KNOW AND BE ABLE TO DO?

- Implications of the Framework for K-12 Science Education and the NGSS
  - Knowledge of science (disciplinary core ideas, crosscutting concepts)
  - Understanding and engaging in science and engineering practices
  - Content knowledge for teaching DCI, CCC, and practices
  - Teaching practices for teaching DCI, CCC, and practices

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Q1: WHAT DO NOVICES NEED TO KNOW AND BE ABLE TO DO?

- Implications of the Common Core State Standards for ELA
  - Knowledge of literacy: reading, writing, speaking, listening
  - Understanding and engaging in literacy skills and demonstrating literacy capacities
  - Content knowledge for teaching literacy knowledge and skill in content areas
  - Teaching practices for teaching literacy knowledge and skill in content areas

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Q2: WHAT CAN TEACHER EDUCATION DO TO SUPPORT THE DEVELOPMENT OF THAT KNOWLEDGE AND PRACTICE?

- Brief description of secondary teacher education
- Examples from elementary teacher education

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Q2: WHAT CAN TEACHER EDUCATION DO? EXAMPLES FROM SECONDARY TE AT U-M

- Coherent course sequence includes (among other coursework):
  - Using Literacy to Teach and Learn Science Content in the Secondary Schools
    - a discplinary literacy class specifically for science majors
  - Differentiating Instruction to Meet the Diverse Needs of Learners
  - Science Methods
  - Student Teaching

FEATURES WORKING WITH LITERACY FOR SCIENCE IN THE SECONDARY PROGRAM

- Focus on…
  - Supporting *writing to communicate* knowledge and findings and *close reading* to obtain information and analyze the validity of claims
  - Differentiated instruction and strategic scaffolding using literacy strategies (e.g., graphic organizers) specifically related to science content
- Practice-based learning throughout the program
- Use of records of practice from science classrooms

Q2: WHAT CAN TEACHER EDUCATION DO? EXAMPLES FROM ELEMENTARY TE AT U-M

- Coherent course sequence includes (among other coursework)
  - Children as Sensemakers #1
  - Literacy #1
  - Facilitating Classroom Discussions
  - Literacy #2
  - Children as Sensemakers #2
  - Science Methods
  - Student Teaching
- Disciplinary literacy threaded throughout program

Q2: WHAT CAN TEACHER EDUCATION DO? EXAMPLES FROM ELEMENTARY TE AT U-M

- Children as Sensemakers #1
  - Course focus: Developing an orientation that children are constantly engaged in making sense of the world, and knowledge and skills related to mediating that sensemaking
  - First month of teacher education program
  - Field-based class assignments include a series of interviews and interactive reading. These are heavily supported by the teacher educators.

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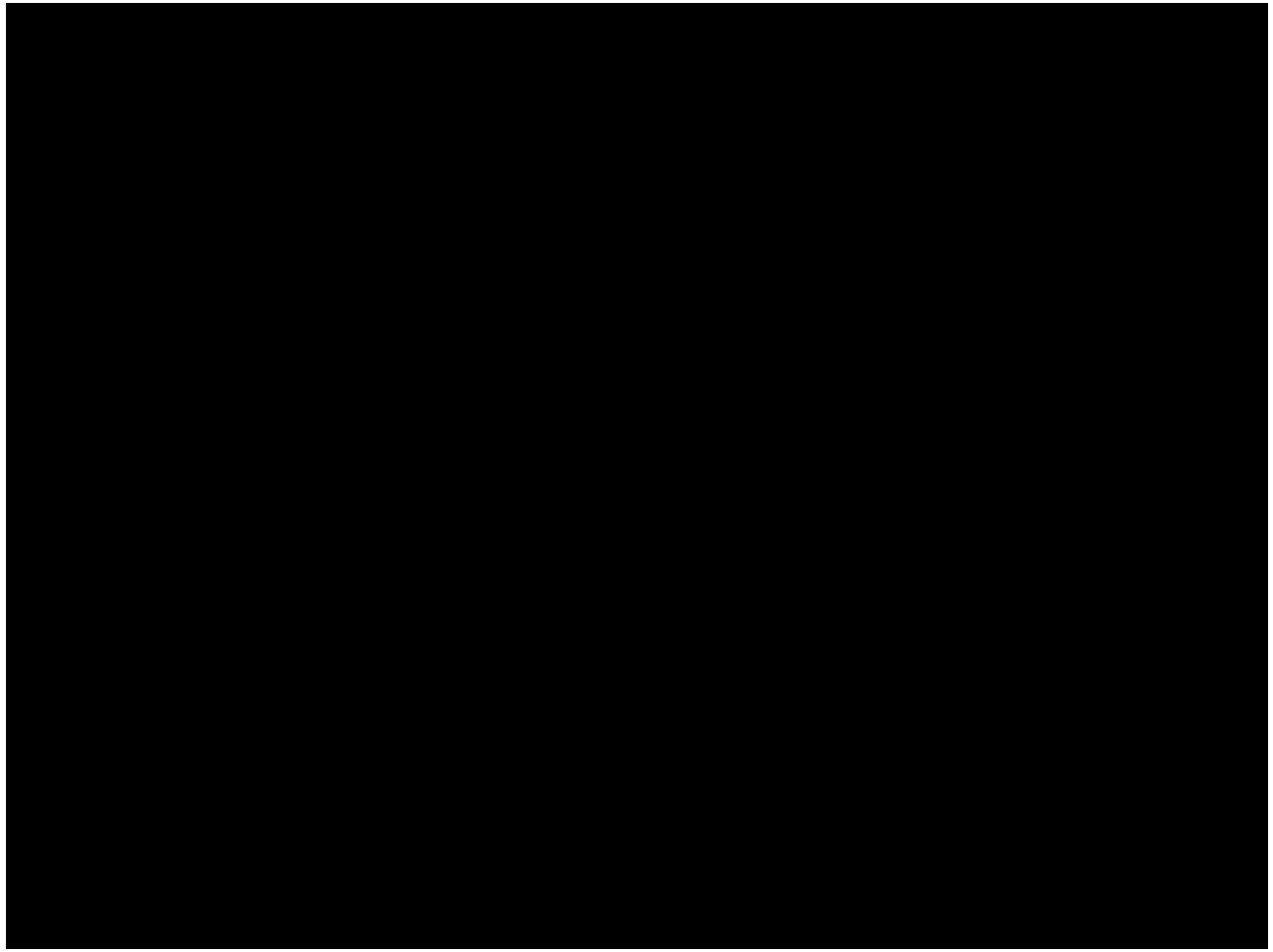
Q2: WHAT CAN TEACHER EDUCATION DO? EXAMPLES FROM ELEMENTARY TE AT U-M

- Science methods
  - Course focus: Developing ability to enact science lessons and develop knowledge and practices related to science lesson enactment
  - Third semester of the teacher education program
  - Field-based class assignments include teaching two science lessons



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Q2: WHAT CAN TEACHER EDUCATION DO?

- Using innovative pedagogies of practice
  - Representations of practice such as videos of teaching
  - Decompositions of practice such as an instructional framework for science lessons
  - Approximations of practice such as rehearsals and small-scale teaching
- Supporting novices in learning a range of scaffolding strategies, such as:
  - Claim-evidence-reasoning framework for explanation and argumentation
  - Participation roles for productive classroom discourse
- Infusing disciplinary literacy throughout coursework and fieldwork
  - Examining literacy-related products (e.g., research articles) and participation genres (e.g., conference talks, research group meetings) of scientists and engineers
  - Developing norms for discourse of argumentation and evidence with consideration of audience
  - Ensuring that the literacy work is infused meaningfully into science investigations

IMPLICATIONS OF NGSS AND CCSS FOR TEACHER EDUCATION

- Novice teachers need to be able to…
  - hear and see the science in students' talk, artifacts, and writing
  - develop discourse norms that allow students to talk and write science
  - develop and use scaffolding to support students in science-and-literacy practices
  - use, find, interpret, and evaluate informational text, and support students in doing so
  - generate, use, and evaluate a *wide range* of texts, including representations of ideas and of data, and support students in understanding these
  - do all these things to support *all of the students* in the classroom

QUESTIONS?

- For more, feel free to email us
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