

What does discourse look like in science classrooms?



Productive Discourse in the Science Classroom: *Fostering Opportunities for Rich Classroom Discourse*

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Goals

- To explain the purpose of productive scientific discourse for students
- To learn about effective strategies for fostering productive scientific discourse supporting a sense-making environment

NM STEM Ready! Science Standards



Together, the NGSS in their entirety,
plus the New Mexico 6
specific standards comprise the
NM STEM Ready! science standards.

Importance of Productive Science Discourse

- Makes student thinking visible
- Helps student clarify thinking
- Produces usable knowledge
- Refines student thinking through sense making
- All voices participate

Video

As you watch the video, please look for:

1. What structures are in place for discussions to occur?
2. What strategies does the teacher use to engage students in discussions?

Video Link:

<https://www.teachingchannel.org/video/how-discussion-enhances-learning>

Video Reflection

From the video:

1. What structures are in place for discussions to occur?
2. What strategies does the teacher use to engage students in discussions?

Possibilities of Productive Discourse

4 Possible Purposes of Productive Discourse

- Elicitation
- Consolidation
- Data Collection
- Explanation

Possibilities of Productive Discourse

Elicitation

- Students are:
 - Sharing their ideas or prior knowledge related to concepts/phenomenon
 - Engaging in new learning
- Usually done when launching anchoring phenomenon

Adapted from O'Connor, C., & Michaels, S. (2011) & Chapin, S., O'Connor, C, & Anderson, N. (2012)

Possibilities of Productive Discourse

Consolidation

- Students are:
 - Solidifying their understanding
 - Relating their learning back to the bigger scientific concept/phenomenon

Adapted from O'Connor, C., & Michaels, S. (2011) & Chapin, S., O'Connor, C, & Anderson, N. (2012)

Possibilities of Productive Discourse

Data Collection

- Students are:
 - Making sense of data
 - Critiquing data
 - Finding patterns
 - Evaluating different data representations

Adapted from O'Connor, C., & Michaels, S. (2011) & Chapin, S., O'Connor, C, & Anderson, N. (2012)

Possibilities of Productive Discourse

Explanation

- Students are:
 - Making a claim with evidence to support
 - Using multiple forms of evidence gathered during learning to construct an explanation

Adapted from O'Connor, C., & Michaels, S. (2011) & Chapin, S., O'Connor, C, & Anderson, N. (2012)

Cognitive Demand of Questions

- Low cognitive demand
 - Vocabulary, recalling facts, procedural
 - Questions involving a “right answer”
- High cognitive demand
 - Ask students *to do something* with ideas
 - Not a discrete answer

From Windschitl, M., Thompson, J. J., & Braaten, M. L. (2018)

Supporting Productive Discourse

Creating a Safe Space

A safe space looks like students....

Supporting Productive Discourse

Creating a Safe Space

A safe space looks like students...

- Sharing ideas with one another
- Actively listening to one another
- Taking risks in sharing their thinking
- Responding respectfully to peers
- Valuing everyone's ideas

Supporting Productive Discourse

Norms

- Norms – a set of practices for productive group interaction to enhance the quality and productivity of all forms of conversation in any group.
- Co-construct norms with students to build ownership

Norms (cont.)

When co-creating norms, it is recommended to:

- Select/construct from the following three categories:
 - Accountability to science and classmates
 - Equity
 - Respect for each other
- Ask students what might interfere in fully participating
- Limit to 3–5 norms
- Consistently re-enforce until norms are established practices

Adapted from Chapin, O'Connor, and Anderson (2012) and Michaels and O'Connor (2011)

Supporting Productive Discourse

Talk Formats

- Partner
 - A low-stakes format where students can explore ideas with one another
 - Students refine their own ideas/thoughts
 - Can be done before or during whole group discourse
 - A brief discussion building towards small/whole group discussion
 - Can provide scaffolds (sentence starters)

Supporting Productive Discourse

Talk Formats (cont.)

- Small Group
 - Involves 2–4 students sharing ideas
 - Teachers are monitoring
 - Expectations, time limit, and accountability are set for small group

Supporting Productive Discourse

Talk Formats (cont.)

- Whole Group
 - All students participate in common sense-making experience
 - Teacher-guided
 - Minimal between students & teacher
 - Between students with teacher as facilitator

Supporting Productive Discourse

Question and Sentence Stems

- Support students in beginning conversations to:
 - Deepen and support reasoning with evidence
 - Listen to other's ideas
 - Clarify ideas
 - Evaluate ideas

Resources

- [NM STEM Ready! Science Resources Page](#)
- [Doing and Talking Math and Science](#)
 - University of Wisconsin & WIDA Consortium
- Project EXCELL's [GO TO Strategies](#)
- STEM TEACHING TOOLS: [#6](#), [#48](#)
- [Talk Science Primer](#) from The Inquiry Project
- A [Discourse Primer](#) from Ambitious Science Teaching
- [4 Goals and Moves Checklist](#)

Upcoming Professional Learning

INSPIRE 2019

[Making Sense of SCIENCE \(June 3–14, 2019\)](#)

Final Reflection

What are the possibilities for discourse as a learning tool in a NM STEM Ready! science classroom?

References

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