INQUIRY ACROSS THE CONTENT AREAS: SCIENCE AND SOCIAL SCIENCE INQUIRY
Objectives

- What is Inquiry?
- Inquiry Process and Strategies
- Available Resources
I Thought Science Avoids Inquiry...

- NGSS specifically stayed away from using the term inquiry in the standards
  - Concerned it was a misused “buzz word”

- Scientific and Engineering Practices define what student inquiry should look like every day in the science classroom

- Engaging students in inquiry in science applies to the scientific process NOT the engineering process
  - Scientific is asking a question and researching or investigating to find the answer
  - Engineering is identify a problem and design a solution
  - Not every lesson has an engineering component but every unit should have an engineering component – engineering is an important component of NGSS but isn’t always part of every lesson
    - 2nd grade students learn about how water interacts with their environment within their unit they may notice problem of water under the swing and design a solution
What is Inquiry?

- Inquiry-based learning is a complex process where students attempt to convert information into useful knowledge
  - They do this by...
    - asking questions
    - finding resources to gather information to answer questions
    - interpreting the information
    - reporting the findings
    - reflecting upon their thinking
Why Inquiry?

- The impact of inquiry-based instruction on student learning was presented in a 2008 Edutopia article, *Powerful Learning: Studies Show Deep Understanding Derives from Collaborative Methods* by Brigid Barron and Linda Darling-Hammond which summarized a multitude of research that has been conducted on the subject. Barron and Darling-Hammond summarize research findings into several key points:
  
  A growing body of research has shown the following:
  
  - Students learn more deeply when they can apply classroom-gathered knowledge to real-world problems, and when they take part in projects that require sustained engagement and collaboration.
  
  - Active-learning practices have a more significant impact on student performance than any other variable, including student background and prior achievement.
  
  - Students are most successful when they are taught how to learn as well as what to learn.

The full text of Darling-Hammond and Barron’s article can be found at: https://www.edutopia.org/inquiry-project-learning-research
Why Inquiry?

- Components of inquiry are found across the standards of many subject areas:
  - Science and SS
  - ELA – weave strands together
  - Math – Practice Standards 1 and 3

- Aligns to Danielson
  - Components in Domains 1, 2, & 3 can all be addressed with the use of inquiry in the classroom
Real-World Example

As you watch:
Identify at least one key component necessary in the inquiry process.

http://goo.gl/kxyXC0
Inquiry Process

- There are many ways to plan for units of inquiry in the classroom, it’s not a one-size-fits-all approach!

- One possible instructional model that may be more geared toward science is the **5E Instructional Model for Science Inquiry**

Inquiry Process

- To help guide teachers in planning SS inquiries we developed the Illinois Social Science Inquiry Process

- 5 stages to guide students through the inquiry process in the classroom
  - Engage and Ask
  - Think Critically
  - Draw Conclusions
  - Communicate Findings
  - Reflect

- All stages are emphasizing things STUDENTS should be doing in the classroom!

- We’re going to use the stages in this process to discuss inquiry today
Engage and Ask

- What topic are we studying?
  - Should adhere to state mandates and lend itself to addressing multiple standards.

- What are the big questions I want my students to be able to answer at the end of the unit?
  - What are the main take-aways I need my kids to understand to address these standards?

- How will I engage or interest my students in this topic?
  - What will grab students’ attention and interest AND enable students to ask questions?
  - EXAMPLES: video, picture, artwork, guest speaker, book, poem, question, article, quote

- What questions do my students have about this topic?
  - What are my kids wondering about this topic?
  - Questions kids ask will give teacher insight into background knowledge.

- What questions are manageable within the unit?
  - Available resources and time
Engage and Ask: Strategies

- Question brainstorm
- KWL (and variations)
- Driving Question Board
- Question Formulation Technique ([http://rightquestion.org/](http://rightquestion.org/))
  - QFT Small Group Worksheet

**Consider providing students with an image, quote, video/audio clip, or text excerpt to prompt their questioning.**
Driving Question Board

- Gives students the opportunity to explore essential questions and allow for:
  - Making Connections
    - Allows students to share prior knowledge; Creates a coherent story from disconnected experiences; Connects small ideas to essential question; Serves as visual reminder
  - Getting Organized
    - Assists in connecting and synthesizing ideas; Similar to concept maps
  - Scaffolding Question-Asking
    - Anchoring phenomena serves as a trigger for question generation
    - Sorting questions into categories creates focus, helps connect them to the main idea and allows them to vary the type and level of questions asked
    - Students can ask questions at higher levels of complexity
  - Imparting Ownership
    - Students develop the questions and investigations, creating a sense of ownership over the process and learning
    - DQBs vary between classes to reflect the learning of the groups

*Fortus et al 2008* - paper on DQBs
Think Critically

- Reading and understanding information
  - Incorporating *multiple* sources to gather information

- Analyzing sources, information, or data
  - Conducting investigations
  - Critically analyze sources
  - How do I know which sources are valid or reliable? Is there implicit or apparent bias in the sources?

- Conducting Investigations
  - Testing theories, revising, retesting

- Using progressive graphic organizers, journaling, writing or drawing to organize initial thoughts

- Using collaboration or discussion techniques to further refine thinking
Think Critically: Strategies

**Some strategies used to help students think critically can actually propel them through the rest of the inquiry process.**

- **Textbook Activity Guide (TAG)** – (adapted from Janet Allen author of Yellow Brick Roads to Reading)
  - about TAG

- **Read, Rate, Reread** – Kelly Gallagher

- **Collaboration and Discussion Techniques**
  - Think Pair Share (and variations)
  - Structured Academic Controversy
  - Back Pocket Questions – general and math
  - Sentence Stems
  - Sketch to Stretch
Text Activity Guide Tips:

- Determine what is most important
- Use the Inquiry Process Guide
- Scaffold instruction

- Increase the amount students read in a single task, start with short passages and gradually increase

- Increase the complexity/difficulty
  - From beginning of the guide to the end of the guide
  - Beginning of the year to the end of the year

- Some skills might be practiced with a partner near the beginning of the year but expected independently later in the year. (Summarizing, synthesizing, analyzing, etc..)
Draw Conclusions

- Answering big question(s) of unit
  - Addressing enduring understandings or main take-aways
- Synthesizing ideas to draw conclusions
- Supporting answers with information learned from sources or investigations
Draw Conclusions: Strategies

- **Collaboration and Discussion Techniques**
  - Sentence Stems
  - Numbered heads/Talking Chips
  - Think Pair Share (and variations)
  - Structured Academic Controversy
  - Back Pocket Questions – general and math

- **Other Strategies**
  - Claim, Evidence, Reasoning (CER)
    - Claim – What do you know? (ex: Air is matter.)
    - Evidence – How do you know that? (ex: As we added air to the basketball, the mass of the basketball increased.)
    - Reasoning – Why does your evidence support your claim? (ex: This shows that air has mass which is one of the characteristics of matter.)
    - Together these build an explanation.
  - Written Response
    - Journaling, Graphic Organizer, Short Responses
  - Textbook Activity Guide - (adapted from Janet Allen author of Yellow Brick Roads to Reading)
    - about TAG
  - Article of the Week – from Kelly Gallagher
    - Kelly Gallagher’s AOW

**Collaboration and Discussion Techniques can help students refine their thinking but students need opportunities to explain their thinking independently even after group discussion or deliberation.**
Claim, Evidence, Reasoning (CER)

https://www.youtube.com/watch?v=faSAI0Anf9E
https://www.youtube.com/watch?v=5KKsLuRPsU
http://www.activatelearning.com/claim-evidence-reasoning/
teacher, author, speaker, coach—dedicated to helping students become better readers and writers

Vale MS in Vale, OR sample AOW
Communicate Findings

- What methods will be used for students to demonstrate what they have learned?
  - Answer the overall question(s) of the unit
  - This can be the unit assessment as long as it connects to overall unit objectives

- Who will this learning be shared with?
  - Engagement is enhanced when students can share what has been learned beyond the classroom
  - Take informed action (advocate) based upon what students have learned if/when appropriate
Communicate Findings: Strategies

- **Writing**
  - Can use CER to support claims in written work

- **Product/project**
  - Poster
  - Flyer
  - Brochure
  - Cartoon/Comic Strip
  - Tic-Tac-Toe/Choice Board

- **Presentation/Speech**
  - PPT
  - Commercial
  - Rap
  - Play
Common Craft and Museum Box Videos

https://www.youtube.com/watch?v=4iHLEY9etWg

https://www.youtube.com/watch?v=cj5Y_4XIMo&t=54s

Common Craft Video
https://www.commoncraft.com/

Museum Box
http://museumbox.e2bn.org/
Reflect

- How has students’ thinking changed based on what they have learned through the inquiry process?
  - Beliefs
  - Behaviors
  - Students and teachers reflect on experience with the inquiry process
Reflect: Strategies

- Collaboration and Discussion Techniques
  - Think Pair Share (and variations)
  - 3-2-1 (and variations)
  - Sentence Stems
  - MRI - summarize the Main idea; Reflect on the meaning; what are the Implications for my life?

- Independent Reflections
  - Exit Note
    - Response Questions: How might you look at _____ differently now? How might you respond differently now?
    - Suggestion for improving the inquiry process in the future
  - 3-2-1 (and variations)
  - Sketch
AVAILABLE RESOURCES
Science Resources

- **The Inquiry Project** is a research project exploring the use of inquiry and investigative practices to deepen student understanding of matter for students in grades 3-5.
- **Talk Science** is web-based professional development to specifically build educators skills for productive discussion in the science classroom.
- **SOLE**: Self Organized Learning Environment
  - Big Question, Investigate, Review
Social Science Resources

- Illinois Social Science in Action website
  - [http://www.ilsocialscienceinaction.org/](http://www.ilsocialscienceinaction.org/) (is also linked from IL Classrooms in Action)

- Resources:
  - **Illinois Resources** – all resources created by Content Specialists specifically aligned to the Illinois Social Science Standards
  - **Resource Website** – external websites that may be helpful to support standards implementation in the classroom (many may be aligned to C3 Framework)
Newly-Released Illinois-Specific Social Science Resources

- Social Science Inquiry Graphics K-12
  - Intention is to support teachers with the goal of engaging students in the inquiry process
  - Statements include suggested steps for each stage of the inquiry process
  - Select grade level from: http://www.ilsocialscienceinaction.org/illinois-resources.html
Katie Elvidge – Social Science Content Specialist
- kelvidge@isbe.net
- www.ilclassroomsinaction.org
  - Resources to support all content areas
  - www.ilsocialscienceinaction.org
  - Illinois Resources – all resources created by Content Specialists specifically aligned to the Illinois Social Science Standards
  - Resource Website – external websites that may be helpful to support standards implementation in the classroom (many may be aligned to C3 Framework)

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Please provide some brief feedback by turning in the half sheet before you leave. Thank you!!