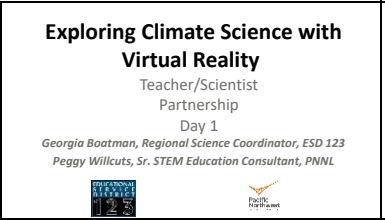
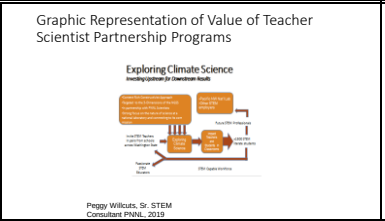
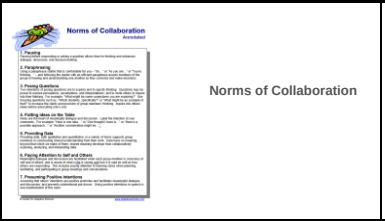
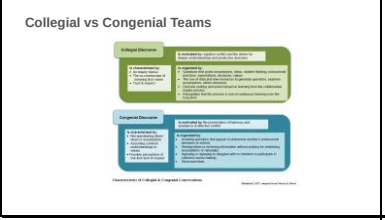


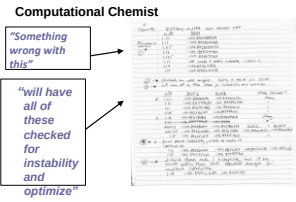
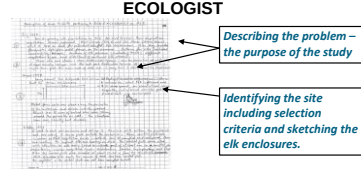
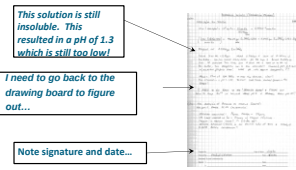
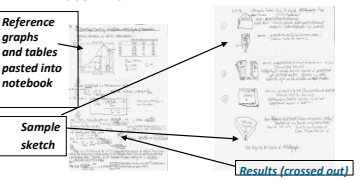
Facilitation Guide Educational Service District 123 and Pacific Northwest National Laboratory Exploring Climate Science with Virtual Reality Classroom Connections Field Experience with Scientists Understanding Standards and Phenomena		
Slide 1		● Restrooms / Evacuation Site / Escorted Badges Slide 1 5 minutes Welcome to Exploring Climate Science With Virtual Reality(Georgia) ● Review Agenda ● Wear two Hats (label binder tabs) ○ Adult Learner Hat ○ Teacher Hat
Slide 2		Slides 2-4 10 to 12 minutes Review the graphic of the importance for our future STEM Professionals of engaging in Teacher Scientist Partnerships
Slide 3		Slides 2-4 10 to 12 minutes ○ Pass out Norms of Collaboration from Center for Adaptive Schools ○ Read over the document ■ identify one norm you will work on this week and share with a colleague
Slide 4		Slides 2-4 10 to 12 minutes Review Collegial VS Congenial Teams and point out we strive to be collegial in order to move learning forward ■ Skim the document ■ Discuss the notion of these two things



License: [Creative Commons Attribution 4.0](https://creativecommons.org/licenses/by/4.0/)

Georgia Boatman
Regional Science Coordinator
Educational Service District 123

Peggy Willcuts
Sr. STEM Consultant
Pacific Northwest National Laboratory

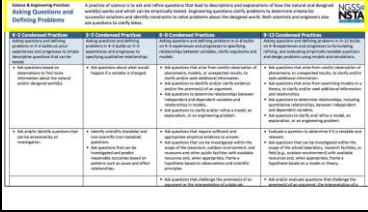
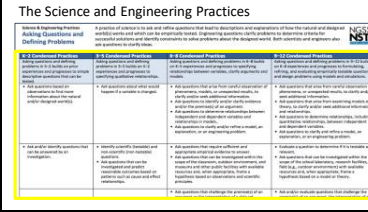
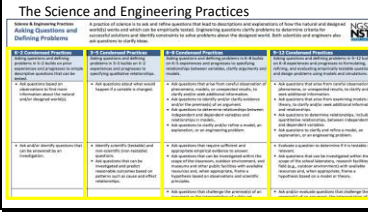
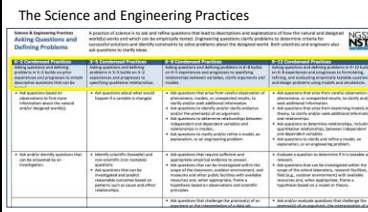
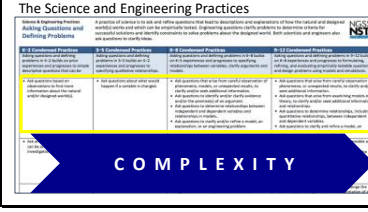
Slide 5	Laboratory Record Book 	Slides 5-9 15 to 20 minutes • Hand out LRBs and Ribbons • Hand out Unclassified LRBs • Share slides of scientists and Frannie's notebooks in the field. • Think about the types of data and the level of detail you desire
Slide 6	Computational Chemist 	Slides 5-9 15 to 20 minutes
Slide 7	ECOLOGIST 	Slides 5-9 15 to 20 minutes
Slide 8	PERSISTENCE OF A BIOFUELS INTERN ... 	Slides 5-9 15 to 20 minutes
Slide 9	MATERIALS SCIENTIST 	Slides 5-9 15 to 20 minutes Now time to work with Climate Scientists for the next day and a half.
Slide 10	Exploring Climate Science with Virtual Reality Teacher/Scientist Partnership Day 3 Georgia Boatman, Regional Science Coordinator, ESD 123 Peggy Willcuts, Sr. STEM Education Consultant, PNNL 	Slide 10 Marker for Teacher Hat day



License: [Creative Commons Attribution 4.0](https://creativecommons.org/licenses/by/4.0/)

Georgia Boatman
Regional Science Coordinator
Educational Service District 123

Peggy Willcuts
Sr. STEM Consultant
Pacific Northwest National Laboratory

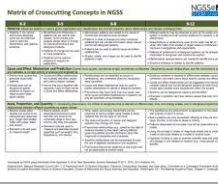
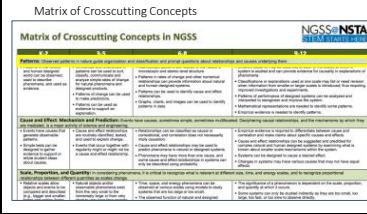
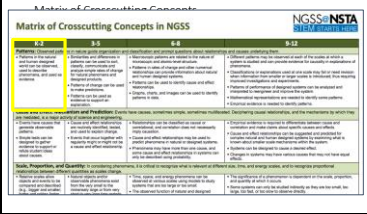
Slide 11		Slides 11-17 30 minutes - Hand out and examine all SEPs - Show Bethany video and have participants identify the SEPs they see in the video - Whole Group Share Out - Make a claim about what you saw and provide evidence
Slide 12		Slides 11-17 30 minutes Pass out SEPs Explain Matrices Walk through the parts
Slide 13		Slides 11-17 30 minutes Pass out SEPs Explain Matrices Walk through the parts
Slide 14		Slides 11-17 30 minutes Pass out SEPs Explain Matrices Walk through the parts
Slide 15		Slides 11-17 30 minutes Pass out SEPs Explain Matrices Walk through the parts
Slide 16	Science and Engineering Practices Read about your SEP in the SEP Matrix - look at the 9-12 grade level progressions for each SEP - What are the 3-5 most important ideas to remember about this SEP? - What is the level of rigor for this SEP at the 6-8 grade level - Share out to your group, summarizing the SEP and thoughts about the rigor at this grade level	Slides 11-17 30 minutes Directions for them to jigsaw the 8 Science and Engineering Practices in teams of 8



License: [Creative Commons Attribution 4.0](https://creativecommons.org/licenses/by/4.0/)

Georgia Boatman
Regional Science Coordinator
Educational Service District 123

Peggy Willcuts
Sr. STEM Consultant
Pacific Northwest National Laboratory

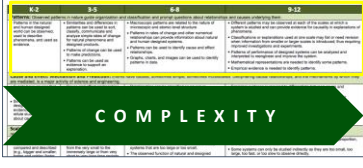
Slide 17	Science and Engineering Practices  ● Watch the video ● Make note of any SEPs you see students engaging in Ambitious Science Teaching Bethany's class https://ambitiousscienceteaching.org/high-school-series-%E2%80%A2ecosystem-dynamics/#1479376606316-a25bc7d0-9145	Slides 11-17 30 minutes AST Bethany's class https://ambitiousscienceteaching.org/high-school-series-%E2%80%A2ecosystem-dynamics/#1479376606316-a25bc7d0-9145 Start at about 1:56 and go to 8:55 about 7 minutes Pass out the recording sheet Each take an SEP, make notes on recording sheet read the general descriptor section of SEPs and then study the 9-12 column Discuss what you saw on the video ...which SEPs, how strong, how integrated
Slide 18	The Crosscutting Concepts 	Slides 18-23 20 25 minutes ● Hand out and examine all Crosscutting Concepts Matrix ● Talk through each part of the Matrix ● Show How Whales Change Climate video ● Have people spot where they see CC connections that could be exploited ● Stand and share or Walk and Talk
Slide 19	Matrix of Crosscutting Concepts 	Slides 18-23 25 minutes ● Hand out and examine all Crosscutting Concepts Matrix ● There are 7 Crosscutting concepts and a little general description is given for each ● Show How Whales Change Climate video ● Have people spot where they see CC connections that could be exploited ● Stand and share or Walk and Talk
Slide 20	Matrix of Crosscutting Concepts 	Slides 18-23 25 minutes ● Hand out and examine all Crosscutting Concepts Matrix ● Each Crosscutting Concept is broken down by grade band and described with specificity for that grade band ● Show How Whales Change Climate video ● Have people spot where they see CC connections that could be exploited



License: [Creative Commons Attribution 4.0](https://creativecommons.org/licenses/by/4.0/)

Georgia Boatman
Regional Science Coordinator
Educational Service District 123

Peggy Willcuts
Sr. STEM Consultant
Pacific Northwest National Laboratory

		Stand and share or Walk and Talk																
Slide 21	Matrix of Crosscutting Concepts Matrix of Crosscutting Concepts in NGSS  COMPLEXITY	Slides 18-23 25 minutes - Hand out and examine all Crosscutting Concepts Matrix - The idea is that complexity in the Crosscutting Concepts increases as you move from K to 12 - Show How Whales Change Climate video - Have people spot where they see CC connections that could be exploited - Stand and share or Walk and Talk																
Slide 22	Thinking About Crosscutting Concepts How Whales Change Climate  - First – <u>just read through</u> the CC matrix focusing on your grade level bullets - Watch “How Whales Change Climate” - Identify CCs that could potentially be met with this type of field study	Slides 18-23 25 minutes - Hand out and examine all Crosscutting Concepts Matrix - Show How Whales Change Climate video- the picture is linked - Have people spot where they see CC connections that could be exploited - Shand and share or Walk and Talk https://www.youtube.com/watch?v=rwZR28su0FU																
Slide 23	Debriefing the Video <table><thead><tr><th>Crosscutting Concept</th><th>Relevant Evidence from Whales Video</th></tr></thead><tbody><tr><td>Patterns</td><td>Behavior whales or plankton</td></tr><tr><td>Cause and Effect</td><td>* Overl theme in video: whales caused a cascade of effects in the system</td></tr><tr><td>Scale, Proportion, & Quantity</td><td>The quantity of whales affects the quantity of plankton and impacts the system; Increase in proportion of whales and plankton decrease amount of CO2 in system.</td></tr><tr><td>Systems & Systems Models</td><td>* Chain events in the video: living and nonliving parts of the system are interconnected</td></tr><tr><td>Energy and Matter</td><td>* Food web shows the flow of energy and matter through the parts of the system</td></tr><tr><td>Structure and Function</td><td>Whales contribute to a change in the structure of the ecosystem which affects ocean organisms, oceans, climate</td></tr><tr><td>Stability and Change</td><td>Decrease in whale populations change the system that was stable and a new stability</td></tr></tbody></table>	Crosscutting Concept	Relevant Evidence from Whales Video	Patterns	Behavior whales or plankton	Cause and Effect	* Overl theme in video: whales caused a cascade of effects in the system	Scale, Proportion, & Quantity	The quantity of whales affects the quantity of plankton and impacts the system; Increase in proportion of whales and plankton decrease amount of CO2 in system.	Systems & Systems Models	* Chain events in the video: living and nonliving parts of the system are interconnected	Energy and Matter	* Food web shows the flow of energy and matter through the parts of the system	Structure and Function	Whales contribute to a change in the structure of the ecosystem which affects ocean organisms, oceans, climate	Stability and Change	Decrease in whale populations change the system that was stable and a new stability	Slides 18-23 25 minutes - Hand out and examine all Crosscutting Concepts Matrix - Show How Whales Change Climate video - Have people spot where they see CC connections that could be exploited - Stand and share or Walk and Talk - Share possible connections on table
Crosscutting Concept	Relevant Evidence from Whales Video																	
Patterns	Behavior whales or plankton																	
Cause and Effect	* Overl theme in video: whales caused a cascade of effects in the system																	
Scale, Proportion, & Quantity	The quantity of whales affects the quantity of plankton and impacts the system; Increase in proportion of whales and plankton decrease amount of CO2 in system.																	
Systems & Systems Models	* Chain events in the video: living and nonliving parts of the system are interconnected																	
Energy and Matter	* Food web shows the flow of energy and matter through the parts of the system																	
Structure and Function	Whales contribute to a change in the structure of the ecosystem which affects ocean organisms, oceans, climate																	
Stability and Change	Decrease in whale populations change the system that was stable and a new stability																	



License: [Creative Commons Attribution 4.0](https://creativecommons.org/licenses/by/4.0/)

Georgia Boatman
Regional Science Coordinator
Educational Service District 123

Peggy Willcuts
Sr. STEM Consultant
Pacific Northwest National Laboratory

Slide 24	Is it a Phenomena? 	Slides 24-27 30-45 minutes depending on time ● Watch the video https://www.ngssphenomena.com/phenomena/#/deer-migration/ ● (https://www.youtube.com/watch?v=Jyiv1Lc0dng&feature=youtu.be) This is an additional video from Brian Reiser on the NextGenScience.org site ● Start the Heuristic ● What did you do in your classroom right now... the top box ○ Read short Heuristic STEM Teaching Tool ○ Handout Phenomena Development Tool and tape into notebook and use it to take “notes to self” in the field.
Slide 25	“Phenomenal” Brainstorming  • Think about current science units/lessons you do • Brainstorm a possible phenomena that could “anchor” this unit or some of its lessons • Share the unit context and your brainstorm ideas with table mates https://creativecommons.org/licenses/by-nc/4.0/	Slides 24-27 30-45 minutes depending on time ● Read the slide ● Start the Heuristic ● What did you do in your classroom right now... the top box ○ Watch the video (https://www.youtube.com/watch?v=Jyiv1Lc0dng&feature=youtu.be) ○ Read short Heuristic STEM Teaching Tool ○ Handout Phenomena Development Tool and tape into notebook and use it to take “notes to self” in the field.
Slide 26	Identifying and Developing Academically Productive Phenomena 	Slides 24-27 30-45 minutes depending on time ● Start the Heuristic ● What did you do in your classroom right now... the top box ○ Read short Heuristic STEM Teaching Tool linked from STEM Teaching Tools from University of Connecticut ○ Handout Phenomena Development Tool and tape into notebook and use it to take “notes to self” in the field.



License: [Creative Commons Attribution 4.0](https://creativecommons.org/licenses/by/4.0/)

Georgia Boatman
Regional Science Coordinator
Educational Service District 123

Peggy Willcuts
Sr. STEM Consultant
Pacific Northwest National Laboratory

Slide 27	Transitioning to Classroom Implementation • Finish thinking on Phenomena Development Chart • Think about lessons/units that you teach or may teach where this phenomena would be employed • Begin to develop a classroom experience around this phenomena and the ecology and human impact learning • Be ready to share to the group	Slides 24-27 30-45 minutes depending on time ● Start the Heuristic ● What did you do in your classroom right now... the top box ○ Read short Heuristic STEM Teaching Tool linked from STEM Teaching Tools from University of Connecticut ○ Handout Phenomena Development Tool and tape into notebook and use it to take “notes to self” in the field.
Slide 28	Addressing DCIs • Look at the identified DCIs • Number off by 3 and work with your team of 4 or 5 people • Site evidence on Post-Its of how that DCI was addressed during the week	Slides 28-30 15 minutes Disciplinary Core Ideas that were identified at the beginning of the Summer session on posters on the wall Write down evidence from teacher experience this week that addressed these DCIs Post them on the DCI posters
Slide 29	Reflection and Sense Making • Share out to the group your ideas and progress on incorporating this work into classroom experiences • Reflection on Working With Scientists • Thank you posters for scientists	Slides 28-30 15 minutes Follow directions on Slide
Slide 30	What Will You Share With Students Stand and talk to someone you haven't worked with today: What will you tell your students you did at PNNL this summer?	Slides 28-30 15 minutes Follow directions on Slide
Slide 31	Creative Commons Licensing  License: Creative Commons Attribution 4.0 Georgia Boatman Regional Science Coordinator Educational Service District 123 Peggy Willcuts Senior STEM Consultant Pacific Northwest National Laboratory	● Creative Commons Licensing information



License: [Creative Commons Attribution 4.0](https://creativecommons.org/licenses/by/4.0/)

Georgia Boatman
Regional Science Coordinator
Educational Service District 123

Peggy Willcuts
Sr. STEM Consultant
Pacific Northwest National Laboratory