RESEARCH QUEST: WHAT HAPPENED AT CLEVELAND-LLOYD DINOSAUR QUARRY?

6TH GRADE CURRICULUM STANDARDS ALIGNMENT / SPRING 2016

HOW DO THE *RESEARCH QUEST* INVESTIGATIONS FIT INTO MY CURRICULUM?

The three *Research Quest*: *Mysteries of Cleveland-Lloyd* investigations provide an applied context for students to practice and transfer their knowledge of the science and engineering practices, disciplinary core ideas, and crosscutting concepts that serve as the backbone of Utah's new Science with Engineering (SEEd) Standards. Completing any of the three investigations provides the opportunity for students to apply their knowledge of the natural world and its systems, while also practicing crucial critical thinking skills. We have found that the emphasis on the development and practice of critical thinking skills bring these investigations into alignment with standards in other disciplines, such as English and Language Arts, as well.

HOW CAN THIS ALIGNMENT DOCUMENT HELP ME?

The *Research Quest* investigations are intended to be a resource that can be easily adapted for a variety of needs. Use this document as a starting place to identify the goals and objectives that will be most beneficial to your students. Please note that we have included only the standards and concepts explicitly supported through delivery of the investigations as outlined in the instructional guides. There are many other standards and skills that could be addressed with minor adjustments to lesson plans or through extension activities.

Below is a list of the specific alignments (with page numbers) that are included in this document. For more information on any of these standards and/or frameworks, visit the links provided at the bottom of each section.

UTAH CORE STANDARDS

NATIONAL STANDARDS AND FRAMEWORKS

UTAH CORE STANDARDS

SCIENCE WITH ENGINEERING STANDARDS (SEEd)	
Strand 6.4: Stability and Change in Ecosystems	
Standard 6.4.1	Analyze data to provide evidence for the effects of resource availability on organisms and populations in an ecosystem. Ask questions to predict how changes in resource availability affects organisms in those ecosystems. Examples could include water, food, and living space in Utah environments.
Standard 6.4.2	Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. Emphasize consistent interactions in different environments, such as competition, predation, and mutualism.
Standard 6.4.4	Construct an argument supported by evidence that the stability of populations is affected by changes to an ecosystem. Emphasize how changes to living and nonliving components in an ecosystem affect populations in that ecosystem. Examples could include Utah ecosystems such as mountains, Great Salt Lake, wetlands, and deserts.

For more information, visit http://www.schools.utah.gov/CURR/science/Revision/SEEdStandards68.aspx

SCIENCE	
Intended Learning Outcomes for 6th Grade Science	
1. Use Science Process and Thinking Skills	a. Observe simple objects, patterns, and events, and report their observations. b. Sort and sequence data according to criteria given. d. Compare things, processes, and events. e. Use classification systems. i. Use data to construct a reasonable conclusion.
2. Manifest Scientific Attitudes and Interests	a. Demonstrate a sense of curiosity about nature. c. Pose science questions about objects, events, and processes. d. Maintain an open and questioning mind toward new ideas and alternative points of view. e. Seek and weigh evidence before drawing conclusions.
3. Understand Science Concepts and Principles	b. Distinguish between examples and non-examples of concepts that have been taught. d. Solve problems appropriate to grade level by applying science principles and procedures.

4. Communicate Effectively Using Science Language and Reasoning	a. Record data accurately when given the appropriate form (e.g., table, graph, chart). b. Describe or explain observations carefully and report with pictures, sentences, and models. c. Use scientific language in oral and written communication. d. Use reference sources to obtain information and cite the source.
6. Demonstrate Understanding of the Nature of Science	b. Understand that science investigations use a variety of methods and do not always use the same set of procedures; understand that there is not just one "scientific method." c. Science findings are based upon evidence.

For more information, visit http://www.uen.org/core/core.do?courseNum=3200#ilo

ENGLISH AND LANGUAGE ARTS	
Reading: Information Text	
Standard 1	Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
Standard 2	Determine central idea of a text and how it is conveyed through particular details; provide a summary of the text distinct from personal opinions or judgments.
Standard 4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.
Standard 7	Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.
Writing	
Standard 1	Write arguments to support claims with clear reasons and relevant evidence.
Standard 7	Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.

Speaking and Listening	
Standard 1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. c. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion. d. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.
Standard 2	Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.
Standard 3	Delineate a speaker's argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.
Standard 4	Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.
Language	
Standard 6	Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.

For more information, visit http://www.uen.org/core/core.do?courseNum=4270

EDUCATIONAL TECHNOLOGY (6TH-8TH GRADE)	
Standard 4	Use content-specific tools, software and simulations to support learning and research.

For more information, visit http://www.uen.org/core/core.do?courseNum=2060

SECONDARY LIBRARY MEDIA (6TH-8TH GRADE)	
Strand I Literacy: Reading Engagement	
Standard 1.2	Comprehend literary and informational texts a. Read, listen to, view, and integrate information to build background knowledge
Strand II Literacy: Information and Research	
Standard 1.1	Define an information problem. a. Analyze the task to identify the information problem. b. Seek clarification from teachers and others.
Standard 2.2	Select relevant sources.
Standard 4.1	Engage with information by reading, listening, and viewing sources in a variety of formats. b. Build connections between prior knowledge and new information through engaging with information, and collaborate with others to broaden and deepen understanding. e. Monitor gathered information for gaps or weaknesses and seek additional sources as necessary.
Standard 4.2	Extract relevant information that answers the information problem and meets task requirements. a. Apply critical thinking skills to evaluate and select information in terms of relevance, accuracy, validity, reliability, currency, authority, completeness, format, point-of-view, and timeliness. c. Validate and compare information in sources, noting differences, contradictions, and types of data or research. e. Abstract, summarize, and paraphrase.
Standard 5.1	Organize information from multiple sources. b. Analyze and organize information to support conclusions. d. Evaluate critically whether or not the selected information supports the proposed conclusions.

For more information, visit http://www.uen.org/core/core.do?courseNum=6512

NATIONAL FRAMEWORKS AND STANDARDS

NEXT GENERATION SCIENCE STANDARDS (NGSS)	
MS-LS2 Ecosystems: Interactions, Energy, and Dynamics	
MS-LS2-1.	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
MS-LS2-4.	Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
MS-LS4 Biological Evolution: Unity and Diversity	
MS-LS4.1.	Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.

For more information, visit http://www.nextgenscience.org/overview-dci

P21 FRAMEWORK FOR 21st CENTURY LEARNERS	
Learning and Innovation Skills: Creativity and Innovation	
Think Creatively	• Use a wide range of idea creation techniques (such as brainstorming) • Create new and worthwhile ideas (both incremental and radical concepts) • Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts
Work Creatively with Others	• Develop, implement and communicate new ideas to others effectively • Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work • View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes
Learning and Innovation Skills: Critical Thinking and Problem Solving	
Reason Effectively	• Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation.
Use Systems Thinking	• Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems.
Make Judgments and Decisions	• Effectively analyze and evaluate evidence, arguments, claims and beliefs. • Analyze and evaluate major alternative points of view. • Synthesize and make connections between information and arguments. • Interpret information and draw conclusions based on the best analysis. • Reflect critically on learning experiences and processes.

Solve Problems	• Solve different kinds of non-familiar problems in both conventional and innovative ways. • Identify and ask significant questions that clarify various points of view and lead to better solutions.
Learning and Innovation Skills: Communication and Collaboration	
Communicate Clearly	• Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts. • Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions. • Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade).
Collaborate with Others	• Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal. • Assume shared responsibility for collaborative work, and value the individual contributions made by each team member.
Information, Media and Technology Skills: Information Literacy	
Access and Evaluate Information	• Evaluate information critically and competently
Use and Manage Information	• Use information accurately and creatively for the issue or problem at hand • Manage the flow of information from a wide variety of sources
Life and Career Skills: Flexibility and Adaptability	
Be Flexible	• Understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments
Life and Career Skills: Initiative and Self-Direction	
Be Self-directed Learners	• Reflect critically on past experiences in order to inform future progress
Life and Career Skills: Social and Cross-cultural Skills	
Interact Effectively with Others	• Know when it is appropriate to listen and when to speak.
Work Effectively in Diverse Teams	• Respond open-mindedly to different ideas and values

For more information, visit http://www.p21.org/about-us/p21-framework

FRAMEWORK FOR K-12 SCIENCE EDUCATION		
Science and Engineering Practices	**Disciplinary Core Ideas**	**Crosscutting Concepts**
• Asking questions (for science) and defining problems (for engineering) • Developing and using models • Analyzing and interpreting data • Using mathematics and computational thinking • Constructing explanations (for science) • Engaging in argument from evidence • Obtaining, evaluating, and communicating information	• LS2.A: Interdependent relationships in ecosystems • LS2.C: Ecosystem dynamics, functioning, and resilience • LS4.A: Evidence of common ancestry and diversity • ESS1.C: The history of planet Earth • ESS2.A: Earth materials and systems • ESS2.C: The roles of water in Earth's surface processes	• Patterns • Scale, proportion, and quantity • Systems and system models • Structure and function

For more information, visit http://www.nap.edu/catalog/13165/a-framework-for-k-12-science-education-practices-crosscutting-concepts

WEBB'S DEPTH OF KNOWLEDGE (DOK) LEVELS	
DOK-1- Recall & Reproduction	Recall of a fact, term, principle, concept, or perform a routine procedure.
DOK-2- Basic Application of Skills/ Concepts	Use of information, conceptual knowledge, select appropriate procedures for a task, two or more steps with decision points along the way, routine problems, organize/display data, interpret/use simple graphs.
DOK-3- Strategic Thinking	Requires reasoning, developing a plan or sequence of steps to approach problem; requires some decision making and justification; abstract, complex, or non-routine; often more than one possible answer.
DOK-4- Extended Thinking	An investigation or application to real world; requires time to research, problem solve, and process multiple conditions of the problem or task; non-routine manipulations, across disciplines/content areas/multiple sources.

For more information, visit http://schools.nyc.gov/NR/rdonlyres/D106125F-FFF0-420E-86D9-254761638C6F/0/HessArticle.pdf