



Claim Evidence Reasoning (CER)

Claim

A statement or claim about an observed phenomena or investigation results. Answers a question based on phenomena or lab experience.

Evidence

Data that has been gathered or analyzed, resulting from observations or research. It is data that supports the claim.

Reasoning

An explanation that describes scientific knowledge or principles and accounts for claim and evidence. Provides the why and how evidence.



Sentences Stems

Claim

- According to data, _____
- The data supports (or does not) that _____
- If [this] then [that]....
- Evidence indicates that...

Evidence

- According to the text...
- Data gathered indicates...
- Observed phenomena shows...

Reasoning

- ___ has/have caused ___. This results/resulted in....
- This evidence leads to the conclusion that....
- The evidence supports the claim....

Claim Evidence Reasoning Science

**Joseph S. Krajcik, Charlene Lochbihler
Czerniak**

Claim Evidence Reasoning Science:

Arguing From Evidence in Middle School Science Jonathan Osborne, Brian M. Donovan, J. Bryan Henderson, Anna C. MacPherson, Andrew Wild, 2016-08-30 Teaching your students to think like scientists starts here If you've ever struggled to help students make scientific arguments from evidence this practical easy to use activity book is for you Give your students the critical scientific practice today's science standards require You'll discover strategies and activities to effectively engage students in arguments about competing data sets opposing scientific ideas applying evidence to support specific claims and more 24 ready to implement activities drawn from the physical sciences life sciences and earth and space sciences help teachers to Align lessons to the Next Generation Science Standards NGSS Engage students in the 8 NGSS science and engineering practices Establish rich productive classroom discourse Facilitate reading and writing strategies that align to the Common Core State Standards Extend and employ argumentation and modeling strategies Clarify the difference between argumentation and explanation Includes assessment guidance and extension activities Learn to teach the rational side of science the fun way with this simple and straightforward guide

Assessment in Science Maureen McMahon, 2006 If you want to learn about the latest research on assessment techniques that really work the ideal sourcebook is right here in your hands Assessment in Science is a collection of up to date reports by authors who are practicing K-16 classroom teachers and university based educators and researchers

Handbook of Research on Science Education, Volume II Norman G. Lederman, Sandra K. Abell, 2014-07-11 Building on the foundation set in Volume I a landmark synthesis of research in the field Volume II is a comprehensive state of the art new volume highlighting new and emerging research perspectives The contributors all experts in their research areas represent the international and gender diversity in the science education research community The volume is organized around six themes theory and methods of science education research science learning culture gender and society and science learning science teaching curriculum and assessment in science science teacher education Each chapter presents an integrative review of the research on the topic it addresses pulling together the existing research working to understand the historical trends and patterns in that body of scholarship describing how the issue is conceptualized within the literature how methods and theories have shaped the outcomes of the research and where the strengths weaknesses and gaps are in the literature Providing guidance to science education faculty and graduate students and leading to new insights and directions for future research the Handbook of Research on Science Education Volume II is an essential resource for the entire science education community

Planning Science Instruction for Emergent Bilinguals Edward G. Lyon, Kelly M. Mackura, 2023 This practical resource takes educators through a planning process from selecting standards to designing learning activities that weaves together language literacy and science in ways that are responsive to emergent bilinguals Drawing on extensive and current research the authors show how secondary educators can use students' own language and lived experiences coupled with authentic science practices to provide rich and

relevant language support Using a science unit as a shared text readers will learn how to gather rich knowledge about emergent bilinguals unpack the ideas and language demands of Next Generation Science Standards strategically embed language and literacy standards in the curriculum and sequence learning activities around an anchoring phenomenon a text and an assessment In the process readers will come away with a repertoire of planning tools and examples of how to support emergent bilinguals in using language to collaborate with others and to interpret and produce texts that are central to learning and doing science Planning Science Instruction for Emergent Bilinguals blends theory and practice so readers understand both how and why this planning process can be used to disrupt social inequity for emergent bilinguals Book Features Describes intentional decisions that educators can make when planning a science unit or learning experience Shows how to weave together Next Generation Science Standards Common Core English Language Arts Standards and language development Provides a model unit about kelp forest ecosystems to illustrate how theory is translated into practice Demonstrates how to use emergent bilinguals assets linguistic skills family experiences personal interests to create engaging science instruction Provides a set of planning tools including both blank templates and completed examples to guide educators through the planning process

Supporting Grade 5-8 Students in Constructing Explanations in Science

Katherine L. McNeill, Joseph S. Krajcik, 2012 I would encourage others to use this book as a resource for a professional learning community or department discussion group and the like absolutely I would recommend it why It is simply good for our students developing understanding of science Pamela M Pelletier Senior Program Director Science K 12 Boston Public Schools Boston Massachusetts

Effects of the Claims-evidence-reasoning Writing Framework on Teaching and Learning in Eighth Grade Science Tanya Hobbs Long, 2014 The need for instructing science students on writing evidence based explanations arises from the importance placed on this by the Common Core State Standards for college and career readiness The Claims Evidence Reasoning C E R writing framework may be a means to this end Explanations begin with a claim which makes an assertion or a conclusion about a question problem or observation The evidence supports the claim using scientific data The reasoning part of an explanation is used to justify that the students evidence supports their claim explains why the observations or data count as evidence of this claim by providing scientific principles The framework was used with a variety of lesson types in astronomy and chemistry units Students reported that the C E R framework helped them learn science content The C E R framework also improved students understanding of the nature of science

Teaching Science in Elementary and Middle School Joseph S. Krajcik, Charlene Lochbihler Czerniak, 2007 The need for a scientifically literate population that can apply scientific ideas to solve real world problems in the 21st century has never been greater Yet a growing disconnect exists between this need and the educational capacity to prepare them The mission of Teaching Science in Elementary and Middle School A Project Based Approach 3e is to help answer this need Like its predecessors this new edition is organized around the guiding principles of problem based learning long term

interdisciplinary student centered lessons that are relevant to real world issues and activities This teaching approach engages all young learners regardless of culture race or gender in exploring important and meaningful questions through a process of investigation and collaboration Throughout this dynamic process students ask questions make predictions design investigations collect and analyze data make products and share ideas Changes in this new edition include the following Stronger more explicit connections between PBS inquiry teaching and the National Science Education Standards NSES The theme of establishing the relevance of science to students lives has been expanded It now includes attention to discrepant events anchoring events and experiencing phenomena in addition to its previous focus on driving questions To help children understand that science is about explaining phenomena a new chapter Making Sense of Data now follows the one on Designing and Carrying Out Investigations It contains a section on helping children create evidence based scientific explanations A new section on the challenges of special needs and gifted students The discussion of technology in science teaching have been expanded to include such new devices as wireless handhelds cameras cell phones wikis and ipods The introductory scenarios have been reworked to insure greater relevance to elementary science teaching An accompanying Web site will offer test items and strategies to support students in problem solving and in planning and carrying out investigations This text is appropriate for anyone interested in teaching elementary or middle school science using an inquiry oriented problem based framework *Claim, Evidence, and Reasoning: Evaluation of the Use of Scientific Inquiry to Support Argumentative Writing in the Middle School Science Classroom* Gabriela Mastro,2017 In light of the essential science and engineering practices identified by the Next Generation Science Standards NGSS this study focuses on the specific science and engineering practice engage in argument from evidence and how classroom practices can serve to strengthen this skill National Research Council 2012 p 71 The NGSS focus on inquiry necessitates students use of argument particularly in writing to communicate their knowledge and scientific findings and to develop an understanding of scientific practice The purpose of this teacher action research study is to evaluate the influence of inquiry based argumentative writing exercises based on the Argument Driven Inquiry ADI model in a middle school science classroom Sampson Grooms and Walker 2011 The ADI model while extensive and complex shows promise in building both argumentative writing skills and science content knowledge The results of this study demonstrated that modified iterations of this model should include data sets that are personally meaningful to students writing tasks scaffolded to areas of student need and clear communication of feedback from both peers and teachers focused on all three areas of scientific arguments claim evidence and reasoning Information gained from this study will benefit science educators by yielding information about how scientific argumentative writing can be most effectively implemented into the middle school classroom to yield the maximum benefit for literacy in the science curriculum *The Popular Science Monthly ,1897 Religion and Science as Allies* James Thompson Bixby,1889

Mothers' Speech to Children in Conversations about Conflicting Evidence for Science-related Claims Megan R. Luce,2011

Bible Student and Religious Outlook ,1913 *Supporting Grade 5-8 Students in Constructing Explanations in Science* Katherine L. McNeill,Joseph J. Krajcik,2012 *The Journal of Criminal Law, Criminology and Police Science* ,1912
Christianity and Science John Putnam Gulliver,1880 **The Saturday Review of Politics, Literature, Science and Art** ,1878 **Telegraphic Journal and Monthly Illustrated Review of Electrical Science** ,1886 **Transactions of the Illinois State Academy of Science** Illinois State Academy of Science,1917 Vol 1 covers the organizational meeting Springfield Dec 7 1907 and the first regular meeting Decatur Feb 22 1908 *Earth and Mind II* Kim A. Kastens,Cathryn A. Manduca,2012 Articles refer to teaching at various different levels from kindergarten to graduate school with sections on teaching geologic time space complex systems and field work Each section includes an introduction a thematic paper and commentaries Scribner's Monthly, an Illustrated Magazine for the People ,1874

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