

Michael P. Clough

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Google Scholar Profile

<https://scholar.google.com/citations?user=Jqi581YAAAAJ&hl=en&oi=ao>

FORMAL EDUCATION

- 1994 Ph.D. - Science Education
The University of Iowa
- 1985 M.A.T. - Science Education
The University of Iowa
- 1982 B.A. - Biology (*Cum Laude*)
Drake University

PROFESSIONAL APPOINTMENTS

- 2017 Texas A&M University
Professor (6/17 to present)
- 2014 Iowa State University
Professor (8/14 to 6/17)
- 2005 Iowa State University
Associate Professor (8/05 to 7/14)
- 1999 Iowa State University (8/99 to 7/05)
Assistant Professor
- 1997 The University of Iowa (8/96 to 7/99)
Visiting Assistant Professor
- 1996 Eau Claire Memorial High School (8/90 to 6/96)
Instructor: Biology and Chemistry
- 1995 University of Wisconsin-Eau Claire (1/95 to 5/95)
Instructor: Biology Methods
- 1990 The University of Iowa (1/90 to 5/90)
Instructor: Meaning of Science
- 1987 The University of Iowa (1/87 to 5/90)
Teaching Assistant: Secondary Science Methods II,
Secondary Science Methods III, Elementary Science
Methods, and Science in Historical Perspective.
- 1985 Sherrard Jr./Sr. High School
Sherrard, Illinois
Instructor: Biology, Chemistry, and Physics

HONORS/ AWARDS

- 2021 Joseph H. Hazen Award for outstanding contributions to the
teaching of history of science, History of Science Society
- 2020 Outstanding Mentor Award
Association for Science Teacher Education (ASTE)
- 2016 Innovations in Teaching Science Teachers Award,
Association for Science Teacher Education (ASTE) Conference

- 2015 Tamaratt Visiting Scholar,
University of Calgary, Calgary, Alberta, Canada
- 2015 Outstanding Paper Award,
National Association for Research in Science Teaching (NARST) Conference.
- 2012 Implications of Research for Educational Practice Outstanding Paper Award,
Association for Science Teacher Education (ASTE) Conference
- 2011 Exceptional Service Award, Iowa Science Teachers Section,
Iowa Academy of Science
- 2008 Outstanding Achievement in Teaching Award, Iowa State University
- 2007 Sesquicentennial Hubbard Teaching Award, one of four Finalists,
Iowa State University
- 2006 Career Achievement in Teaching Award, College of Human Sciences,
Iowa State University
- 2003 Science Teacher Educator of the Year - Early Career Award,
Association for Science Teacher Education (ASTE)
- 1994 Regional Award for Excellence in Science Education,
Wisconsin Society of Science Teachers (WSST)
- 1992 National Tandy Scholar Outstanding Science Teacher Award.
- 1989 Outstanding Teaching Assistant Award, The University of Iowa

**PROFESSIONAL
MEMBERSHIPS**

American Association for the Advancement of Science (AAAS)
 Association for Science Teacher Education (ASTE)
 International History, Philosophy and Science Teaching (IHPST)
 National Association for Research in Science Teaching (NARST)
 National Science Teachers Association (NSTA)

Manuscripts Under Review or in Progress

- 7. Clough, M. P. Story behind the science: Bringing biology and biologists to life.
- 6. Olson, J. K., Herman, B. C. & Clough, M. P. Theoretical model of factors accounting for NOS instruction
- 5. Clough, M. P., Herman, B. C., Olson, A. R., & Sobotka, A. J. Impact of historical science stories on post-secondary biology students NOS understanding and attitudes toward science.
- 4. Olson, J. K. & Clough, M. P. Structure, pedagogy, and efficacy of a course designed to promote accurate and effective HNOS Instruction.
- 3. Ihrig, L. M., Slade, M. C., Clough, M. P., Herman, B. C. & Ogilvie, C. A. Impact of post-secondary authentic chemistry lab experiences on students' NOS understanding.
- 2. Clough, M. P., Xu, Xihong, & Yan, S. History of science in science education: Efforts, research, and implications.
- 1. Herman, B. C., Clough, M. P., & Sobotka, A. J. Influence of COVID-19 science views, risk perceptions, and group membership on socioscientific decisions. *Journal of Research in Science Teaching*. Under Review

Refereed Publications

- 71. Sobotka, A. S. & Clough, M. P. (2022). Transcending tinkering: Building understanding of content and the nature of the STEM disciplines. *The Clearinghouse*, 95(4), 178-185.
<https://doi.org/10.1080/00098655.2022.2083054>

70. Herman, B. C., Clough, M. P., Asha, R. (In Press). Socioscientific issues thinking and action in the midst of science-in-the-making. *Science & Education*. <https://link.springer.com/article/10.1007/s11191-021-00306-y>
69. Leone, A. E., Daniel, K., French, D., & Clough, M. P. (In Press). Statements of critical significance (SOCS) for communicating succinctly. Book chapter in *Teaching science students to communicate A practical guide*. Springer.
68. Olson, A. R. & Clough, M. P. (2021). An attachment point for meaningful musculoskeletal learning. *American Biology Teacher*, 83(9), 589-593.
67. Clough, M. P. (2020). Using stories behind the science to improve understanding of the nature of science, attitudes toward science, and content understanding. Chapter 28 (pp. 513-525) in McComas (Ed.) *Nature of Science in Science Instruction: Rationales and Strategies*, Springer.
66. Clough, M. P. (2020). Framing and teaching the nature of science as questions. Chapter 15 (pp. 271-282) in McComas (Ed.) *Nature of Science in Science Instruction: Rationales and Strategies*, Springer.
65. Clough, M. P., Herman, B. C., & Olson, J. K. (2020). Preparing science teachers to overcome common obstacles and teach the Nature of Science. Chapter 13 (pp. 239-251) in McComas (Ed.) *Nature of Science in Science Instruction: Rationales and Strategies*, Springer.
64. McComas, W.F., Clough, M.P. & Nouri, N. (2020). Nature of science and classroom practice: A review of the literature with implications for effective NOS instruction. Chapter 4 (pp. 67-111) in McComas (Ed.) *Nature of Science in Science Instruction: Rationales and Strategies*, Springer.
63. McComas, W. F. & Clough, M. P. (In 2020). Nature of science in science instruction: Meaning, advocacy, rationales and recommendations. Chapter 1 (pp. 3-22) in McComas (Ed.) *Nature of Science in Science Instruction: Rationales and Strategies*, Springer.
62. Clough, M. P. (2019). Science teacher professionalism: Urgency and vision. Book chapter in Akpan, B. (Ed.) *Science education: Visions of the Future*, Next Generation Education, Abuja, Nigeria.
61. Pleasants, J. B., Clough, M. P., & Olson, J. K. (2019). Teaching and learning about the nature of technology: Urgency and vision. Book chapter in Akpan, B. (Ed.) *Science education: Visions of the Future*, Next Generation Education, Abuja, Nigeria.
60. Yan, S., Scaramuzzo, P., Clough, M. P., & Slattery, P. (2019). Moral education in troubled times: Insights from Barad, Levinas, and Baumann. In S. L. Raye., S. Masta., S. T. Cook., & J. Burdick (Eds.), *Ideating pedagogy in troubled times: Approaches to identity, theory, teaching, and research*. Charlotte, NC: Information Age Press.
59. Pleasants, J., Clough, M. P., Olson, J. K., & Miller, G. (2019). Fundamental issues regarding the nature of technology: Implications for STEM education. *Science & Education*, 28(3-5), 561-597.
58. Herman, B. C., Olson, J. K. & Clough, M. P. (2019). The Role of informal support networks in teaching the nature of science. *Research in Science Education*, 49(1), 191-218. DOI 10.1007/s11165-016-9610-2
57. Wilcox, J., Kruse, J.W., & Clough, M.P. (2017). Blending in: Using an adaptation activity to integrate math and science. *Science & Children*. 54(9), 60-66.
56. Herman, B. C., Clough, M. P. & Olson, J. K. (2017). Pedagogical reflections by secondary science teachers at different NOS implementation levels. *Research in Science Education*, 47(1), 161-184.
55. Clough, M. P. & Herman, B. C. (2017). The role of history and nature of science in climate change teaching and learning. Chapter 2 (pp. 15-28) in In Shepardson, D., Roychoudhury, A. & Hirsch, A. (Eds.) *Teaching and learning about climate change: A framework for educators*. Routledge, New York.

<https://www.routledge.com/Teaching-and-Learning-about-Climate-Change-A-Framework-for-Educators/Shepardson-Roychoudhury-Hirsch/p/book/9781138642621>.

54. Clough, M. P. (2017). History and nature of science in science education. Chapter 3 in Taber, K. & Akpan, B. (Eds.) *Science education: An international course companion*, pp. 39-51. Rotterdam, The Netherlands, Sense Publishers.
53. Clough, M. P. & Olson, J. K. (2016). Connecting science and engineering practices: A cautionary perspective. Chapter 15 in Annetta, L. A. & Minogue, J. (Eds.) *Connecting science and engineering education practices in meaningful ways: Building bridges*. Contemporary Trends and Issues in Science Education Series, Dordrecht, The Netherlands: Springer. <http://www.springer.com/us/book/9783319163987>
52. Herman, B. C. & Clough, M. P. (2016). Teachers' longitudinal NOS understanding after having completed a science teacher education program. *International Journal of Science and Mathematics Education*, 14(1), 207-227.
51. Clough, M. P. (2015). A science education that promotes the characteristics of science and scientists: Features of science teacher education. *K-12 STEM Education*, 1(4), 157-165.
50. Clough, M. P. (2015). A science education that promotes the characteristics of science and scientists: Features of teaching. *K-12 STEM Education*, 1(3), 113-121.
49. Wilcox, J., Kruse, J. W. & Clough, M. P. (2015). Teaching science through inquiry: Seven common myths about this time-honored approach. *The Science Teacher*, 82(6), 62-67.
48. Rice, J. W., Clough, M. P., Olson, J. K., Adams, D. C. & Colbert, J. T. (2015). Understanding and acceptance of biological evolution: A study of university faculty. *Evolution: Education and Outreach*, 8(8), <http://www.evolution-outreach.com/content/8/1/8>
47. Clough, M. P. (2015). A science education that promotes the characteristics of science and scientists: Features of content, activities and materials. *K-12 STEM Education*, 1(2), 65-73.
46. Clough, M. P. (2015). Role of visual data in effectively teaching the nature of science. Chapter 13 (pp. 311-332) in Finson, K.D. & Pedersen, J. (Eds.) *Application of visual data in K-16 science classrooms*. Information Age Publishing, Charlotte, NC. <http://www.infoagepub.com/products/Application-of-Visual-Data-in-K-16-Science-Classrooms>
45. Olson, J. K., Tippett, C. D., Milford, T. M., Ohana, C. & Clough, M. P. (2015). Science teacher preparation in a North American context. *Journal of Science Teacher Education*, 26(1), 7-28. <http://link.springer.com/article/10.1007/s10972-014-9417-9>
44. Clough, M. P. (2015). A science education that promotes the characteristics of science and scientists. *K-12 STEM Education*, 1(1), 23-29.
43. Cervato, C., Gallus, W., Slade, M., Kawaler, S., Marengo, M., Woo, K., Krumhardt, B., Flory, D., Clough, M., Campbell, A., Moss, E. & Acerbo, M. (2015). It takes a village to make a scientist: Reflections of a faculty learning community. *Journal of College Science Teaching*, 44(3), 22-29.
42. Herman, B. C., Clough, M. P. & Olson, J. K. (2013). Association between experienced teachers' NOS implementation and reform-based science teaching practices. *Journal of Science Teacher Education*. 24(7), 1077-1102.
41. Clough, M. P. (2013). Teaching about the nature of technology: Issues and pedagogical practices. Chapter 18 in M. P. Clough, J. K. Olson & D. S. Niederhauser (Eds.) *The nature of technology: Implications for learning and teaching*, Sense Publishers, Rotterdam, The Netherlands.

40. Herman, B. C., Clough, M. P. & Olson, J. K. (2013). Teachers' NOS implementation practices two to five years after having completed an intensive science education program. *Science Education*, 97(2), 271-309.
39. Clough, M. P. & Olson, J. K. (2012). Impact of a nature of science and science education course on teachers' nature of science classroom practices. Chapter 12 in M. S. Khine (Ed.) *Advances in nature of science research: Concepts and methodologies*. Springer, Dordrecht, The Netherlands.
38. Clough, M. P. (2011). Teaching and assessing the nature of science: How to effectively incorporate the nature of science in your classroom. *The Science Teacher*, 78(6), 56-60.
37. Clough, M. P. (2011). The story behind the science: Bringing science and scientists to life in post-secondary science education. *Science & Education*, 20(7), 701-717.
36. Rice, J. W., Warner, D. A., Kelly, C. D., Clough, M. P. & Colbert, J. T. (2010). The theory of evolution is not an explanation for the origin of life. *Evolution: Education and Outreach*, 3(2), 141-142.
35. Olson, J. K., Clough, M. P. & Penning, K. (2009). Prospective elementary teachers gone wild? An analysis of Facebook self-portrayals and expected dispositions of preservice elementary teachers. *Contemporary issues in technology and teacher education*. 9(4). <http://www.citejournal.org/vol9/iss4/maintoc.cfm>. Reprinted in M. P. Clough, J. K. Olson & D. S. Niederhauser (Eds.) (2013) *The nature of technology: Implications for learning and teaching* (Chapter 8), Sense Publishers, Rotterdam, The Netherlands.
34. Clough, M. P., Berg, C. A. & Olson, J. K. (2009). Promoting effective science teacher education and science teaching: A framework for teacher decision-making. *International Journal of Science and Mathematics Education*, 7(4), 821-847.
<http://www.springerlink.com/content/37571ku87w167851/?p=39a591bca01342ebaba81eb490ea96bb&pi=3>
33. Clough, M. P. (2008). Professional development: The need to assess yourself. *Iowa Science Teachers Journal*, 35(3), 3-6. <http://www.iacad.org/istj/35/3/pd.pdf>
32. Metz, D., Klassen, S., McMillan, B., Clough, M., & Olson, J. (2007). Building a foundation for the use of historical narratives. *Science & Education*, 16(3-5), 313-334.
31. Colbert, J. T., Olson, J. K. & Clough, M. P. (2007). Using the web to encourage student-generated questions in large format introductory biology classes, *Cell Biology Education-Life Science Education*, 6, 42-48, <http://www.lifescied.org/cgi/reprint/6/1/42>.
30. Clough, M. P. (2007). Teaching the nature of science to secondary and post-secondary students: Questions rather than tenets. *The Pantaneto Forum*, Issue 25, <http://pantaneto.co.uk/issue-25/>, January. Reprinted (2008) in the *California Journal of Science Education*, 8(2), 31-40.
29. Lunetta, V. N., Hofstein, A. & Clough, M. P. (2007). Learning and teaching in the school science laboratory: An analysis of research, theory, and practice. Chapter 15, in S.K. Abell & N.G. Lederman (Eds.) *Handbook of research on science education*, Lawrence Erlbaum Associates, New Jersey. pp. 393-441.
28. Clough, M. P. (2006). Learners' responses to the demands of conceptual change: Considerations for effective nature of science instruction. *Science & Education*, 15(5), 463-494.
27. Clough, M. P. (2006). The essential role of the nature of science in learning about evolutionary biology: Strategies for enhancing acceptance of evolution. Chapter I-6 in W.F. McComas (Ed.) *Investigating evolutionary biology in the laboratory*, Kendall Hunt, Dubuque. pp. 69-81.
26. Clough, M. P. & Olson, J. K. (2004). The nature of science: Always part of the science story. *The Science Teacher*, 71(9), 28-31. Reprinted in In Koulaidis, V., Apostolou, A. & Kampourakis, K. (Eds.) (2008). *The nature of sciences: Didactical approaches* (pp. 287-296). Child Services Editions, Athens.

25. Olson, J. K & Clough, M. P. (2004). What questions do you have? In defense of general questions: A response to Croom. *Teachers College Record*, <http://www.tcrecord.org/content.asp?contentid=11366>
24. Clough, M. P. (2004). The nature of science: Understanding how the “game” of science is played. Chapter 8 in J. Weld (Ed.) *The Game of Science Education*, Allyn and Bacon, Boston. pp. 198-227.
23. Clough, M. P. & Clough, S. J. (2002). Chewing on ideas: Engaging students in meaningful learning about digestion. *The Science Teacher*, 69(8), 12-14.
22. Clough, M. P. (2002). Using The laboratory to enhance student learning. Chapter 8 in R. W. Bybee (Ed.) *Learning science and the science of learning*, 2002 NSTA Yearbook. National Science Teachers Association, Washington, D.C. pp. 85-94.
21. Olson, J. K. & Clough, M. P. (2001). Technology’s tendency to undermine serious study: A cautionary note. *The Clearing House*, 75(1), 8-13. Reprinted (Chapter 10) in M. P. Clough, J. K. Olson & D. S. Niederhauser (Eds.) (2013) *The nature of technology: Implications for learning and teaching*, Sense Publishers, Rotterdam, The Netherlands.
20. Clark, R. L., Clough, M. P. & Berg, C. A. (2000). Modifying cookbook labs: A different way of teaching a standard laboratory engages students and promotes understanding. *The Science Teacher*, 67(7), 40-43.
19. Clough, M. P. (2000). The Nature of Science: Understanding how the “game” of science is played. *The Clearing House*, 74(1), 13-17.
18. Clough, M. P. & Kauffman, K. J. (1999). Improving engineering education: A research-based framework for teaching. *Journal of Engineering Education*, 88(4), 527-534.
17. McComas, W. F., Clough, M. P. & Almazroa, H. (1998). The nature of science in science education: An introduction. *Science & Education*, 7(6), 511-532.
16. Clough, M. P. (1998). Integrating the nature of science with student teaching: Rationales and strategies. Chapter 11 in W. F. McComas (Ed.) (1998) *The nature of science in science education: Rationales and strategies*. Kluwer Academic Publishers: Dordrecht, The Netherlands. pp. 197-208.
15. McComas, W. F., Clough, M. P., & Almazroa, H. (1998). The role and character of the nature of science in science education. Chapter 1 in W. F. McComas (Ed.) (1998) *The nature of science in science education: Rationales and strategies*. Kluwer Academic Publishers: Dordrecht, The Netherlands. pp 3-39.
14. Smith, M. U., Lederman, N. G., Bell, R. L., McComas, W. F. & Clough, M. P. (1997). How great is the disagreement about the nature of science? A response to Alters. *Journal of Research in Science Teaching*, 34(10), 1101-1103.
13. Clough, M. P. (1997). Strategies and activities for initiating and maintaining pressure on students' naïve views concerning the nature of science. *Interchange*, 28(2-3), 191-204.
12. Colburn, A. & Clough, M. P. (1997). Implementing the learning cycle. *The Science Teacher*, 64(5), 30-33.
11. Clough, M. P. (1997). *Biology: A Community Context*—A new approach to biology education. *Spectrum: The Journal of the Illinois Science Teachers Association*, 23(1), 17-20.
10. Clough, M. P. & Berg, C. A. (1995). Preparing and hiring exemplary science teachers. *Kappa Delta Pi Record*, 31(2), 80-89.
9. Clough, M. P. (1994). Diminish students' resistance to evolution education. *The American Biology Teacher*, 56(7), 409-415.

8. Clough, M. P. & Clark, R. L. (1994). Creative constructivism: Challenge your students with an authentic science experience. *The Science Teacher*, 61(7), 46-49.
7. Clough, M. P., Smasal, R. J. & Clough, D. R. (1994). Managing each minute. *The Science Teacher*, 61(6), 30-34. Reprinted in the National Science Teachers Association (1996) *Block scheduling: Teaching strategies for the restructured school day*, NSTA: Washington, D.C. Reprinted in *The Science Teacher*, 67(1), 51, January 2000.
6. Clough, M. P. (1994). Reducing resistance to evolution education. In W. F. McComas (Ed.) *Investigating evolutionary biology in the laboratory*, Reston: National Association of Biology Teachers, pp. 15-20. Available as ERIC Document 439008 at <http://files.eric.ed.gov/fulltext/ED439008.pdf>
5. Clough, M. P. & Clark, R.L. (1994). Cookbooks and constructivism: A better approach to laboratory activities. *The Science Teacher*, 61(2), 34-37.
4. Clough, M. P. (1992). Research is required reading: Keeping up with your profession. *The Science Teacher*, 59(7), 36-39.
3. Berg, C. A. & Clough, M. P. (1991). Generic lesson design: The case against. *The Science Teacher*, 58(7), 26-31.
2. Berg, C. A. & Clough, M. P. (1991). Only an expensive horoscope. *Educational Leadership*, 48(4), 84.
1. Berg, C. A. & Clough, M. P. (1991). Hunter lesson design: The wrong one for science teaching. *Educational Leadership*, 48(4), 73-78. Reprinted in A. E. Woolfolk (1993) *Readings & Cases in Educational Psychology*. Allyn and Bacon: Boston, pp. 203-209.

Books, Editorials, and Other Publications

96. Olson, A. R., Clough, M. P., & Herman, B. C. (2020). COVID-19 Pandemic and Decision-Making: Waiting for Scientific Certainty is a Fool's Game. <https://storybehindthescience.org/pdf/covid19science.pdf>. *The Story Behind the Science: Bring Science and Scientists to Life* project website, <http://www.storybehindthescience.org>.
95. Sobotka, A. J., Herman, B. C., & Clough, M. P. (2020). COVID-19 Pandemic and the Fool's Errand of Pseudoscience-Based Decision-Making. <https://storybehindthescience.org/pdf/covid19pseudoscience.pdf>. *The Story Behind the Science: Bring Science and Scientists to Life* project website, <http://www.storybehindthescience.org>.
94. Rao, Asha, Poor, S. V., Herman, B. C., & Clough, M. P. (2020). Case Study: To Mask, or Not to Mask – That is the Scientific Question. <https://storybehindthescience.org/pdf/covid19casestudy.pdf>. *The Story Behind the Science: Bring Science and Scientists to Life* project website, <http://www.storybehindthescience.org>.
93. Baldwin, M. & Clough, M. P. (2019). The Development and Acceptance of the Conservation of Mass Law: Progress in Science is Rarely Straightforward or Linear. <http://www.storybehindthescience.org/pdf/earthshape.pdf>. *The Story Behind the Science: Bring Science and Scientists to Life* project website, <http://www.storybehindthescience.org>.
92. Baldwin, M. & Clough, M. P. (2019). Phlogiston and Explanation: The Problem of Combustion. <http://www.storybehindthescience.org/pdf/earthshape.pdf>. *The Story Behind the Science: Bring Science and Scientists to Life* project website, <http://www.storybehindthescience.org>.

91. Gross, B., Olson, A. R., & Clough, M. P. (2019). A Matter of Degrees: Conceptualizing Temperature and Heat. <http://www.storybehindthescience.org/pdf/earthshape.pdf>. *The Story Behind the Science: Bring Science and Scientists to Life* project website, <http://www.storybehindthescience.org>.
90. Gross, B., Olson, A. R., & Clough, M. P. (2019). Calorimetry: Creativity and Invention in Science. <http://www.storybehindthescience.org/pdf/earthshape.pdf>. *The Story Behind the Science: Bring Science and Scientists to Life* project website, <http://www.storybehindthescience.org>.
89. Baldwin, M., Sobotka, A. J., & Clough, M. P. (2019). Conceptualizing Energy: Conservation of Mechanical Energy and the Introduction of Potential Energy. <http://www.storybehindthescience.org/pdf/earthshape.pdf>. *The Story Behind the Science: Bring Science and Scientists to Life* project website, <http://www.storybehindthescience.org>.
88. Gross, B., Kruse, J. W., & Clough, M. P. (2019). Building Ideas: Developing a Model of the Atom. <http://www.storybehindthescience.org/pdf/earthshape.pdf>. *The Story Behind the Science: Bring Science and Scientists to Life* project website, <http://www.storybehindthescience.org>.
87. Schombs, R., Kruse, J. W., & Clough, M. P. (2019). The Origins of Entropy: How culture influences scientific progress. <http://www.storybehindthescience.org/pdf/earthshape.pdf>. *The Story Behind the Science: Bring Science and Scientists to Life* project website, <http://www.storybehindthescience.org>.
86. Schombs, R., Pleasants, J. B., & Clough, M. P. (2019). Rejecting Common Sense: Science and Newton's First Law of Motion. <http://www.storybehindthescience.org/pdf/earthshape.pdf>. *The Story Behind the Science: Bring Science and Scientists to Life* project website, <http://www.storybehindthescience.org>.
85. Proctor, K., Pleasant, J. B., & Clough, M. P. (2019). Worldviews, Universal Gravitation, and the Uneasy Acceptance of Action at a Distance. <http://www.storybehindthescience.org/pdf/earthshape.pdf>. *The Story Behind the Science: Bring Science and Scientists to Life* project website, <http://www.storybehindthescience.org>.
84. Clough, M. P. (2018). Review of *Daytime Nighttime, All through the Year*. *Science Books and Films*. American Association for the Advancement of Science.
83. Clough, M. P. (2018). Review of *Tall Tall Trees*. *Science Books and Films*. American Association for the Advancement of Science.
82. Clough, M. P. (Ed.) (2018). Teaching and Learning about the Nature of Science. Special Virtual Issue of *Science & Education*. Print version. *Science & Education*, 27(1-2), 1-5. Editorial. DOI: 10.1007/s11191-018-9964-0
<http://www.springer.com/education+%26+language/science+education/journal/11191?detailsPage=press>
81. Clough, M. P. (2017). Review of *The Hidden Life of a Toad*. *Science Books and Films*, 53(10), 392-393. American Association for the Advancement of Science.
80. Clough, M. P. (2017). Review of *A Perfect Day for an Albatross*. *Science Books and Films*, 53(10), 391-392. American Association for the Advancement of Science.
79. Zeidler, D. L., Herman, B. C., Clough, M. P., Olson, J. K., Kahn, S. & Newton, M. (2016). Humanitas Emptor: Reconsidering Recent Trends and Policy in Science Teacher Education. *Journal of Science Teacher Education*, 27(5), 465-476.
78. Clough, M. P., Olson, J. K. & Niederhauser, D. S. (Eds.) (2013). *The Nature of Technology: Implications for Learning and Teaching*. Sense Publishers, Rotterdam, The Netherlands. ISBN: 978-94-6209-267-9.
<https://brill.com/abstract/title/37705?rskey=V94coz&result=6>

77. Clough, M. P. (2012). Review of *Unsimple Truths: Science, Complexity, and Policy*. *Science Education*, 96(2), 366-368.
76. Clough, M. P. (2011). Review of *Animal Tails*. *Science Books and Films*, 47(12), 276. American Association for the Advancement of Science.
75. Kruse, J. W. & Clough, M. P. (2011). Hot Conceptual Change: You've Got to have Faith. *Iowa Science Teachers Journal*, Editorial, 38(1), 2-3. <https://www.scienceiniowa.org/ists-journal>
74. Kruse, J. W. & Clough, M. P. (2010). Confronting Doubts about the Intelligibility, Plausibility and Fruitfulness of Inquiry-based Instruction. *Iowa Science Teachers Journal*, Editorial, 37(3), 2-5. <https://www.scienceiniowa.org/ists-journal>
73. Clough, M. P. & Kruse, J. W. (2010). When Dissatisfaction is a Good Thing. *Iowa Science Teachers Journal*, Editorial, 37(2), 2-4. <https://www.scienceiniowa.org/ists-journal>
72. Clough, M. P. & Kruse, J. W. (2010). Conceptual Change: It's Not Just for Teaching Science. *Iowa Science Teachers Journal*, Editorial, 37(1), 2-3. <https://www.scienceiniowa.org/ists-journal>
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11. Clough, M. P. (1996). Review of two books: *Creatures of the Wild* and *Creatures of the Blue*, by the Sierra Club, 1995. *Science Books and Films*, 32(9), 279, American Association for the Advancement of Science.
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Presentations

2022

330. Clough, M. P. Learners' Responses to the Demands of Conceptual Change: Considerations for Effective Nature of Science Instruction – Clarification and expansion. International History, Philosophy, and Science Teaching International Conference, Calgary, CA, July 3-7.
329. Clough, M. P., Olson, A. R., & Sobotka, A. J. Philosophy of science: The central issues for science educators and science teachers. Proposal accepted for inclusion in the International History, Philosophy, and Science Teaching International Conference, Calgary, CA, July 3-7.
328. Herman, B. C., Clough, M. P., & Rao, A. Socio-scientific thinking and action in the midst of science-in-the-making. International History, Philosophy, and Science Teaching International Conference, Calgary, CA, July 3-7.
327. Herman, B. C., Clough, M. P., Sobotka, A. J., & Rao, A. Influence of COVID-19 science perspectives and sociocultural factors on university biology students' pandemic response. International History, Philosophy, and Science Teaching International Conference, Calgary, CA, July 3-7.
326. Poor, S., Herman, B. C., & Clough, M. P. How scientists perceive NOS and its value for science communication. International History, Philosophy, and Science Teaching International Conference, Calgary, CA, July 3-7.
325. Herman, B. C., Clough, M. P., Rao, A., Janney, B. Sobotka, A., Poor, S., & Kidd, A. University biology students' COVID-19 decisions: The interconnected influence of COVID-19 science perceptions and sociocultural membership. National Association for Research in Science Teaching (NARST) international conference. Vancouver, BC, March 27-30.
324. Sobotka, A. J., Janney, B. A., Herman, B. C., Poor, S. V., Kidd, A., Clough, M. P., & Rao, A. University biology students' sociocultural and NOS associated positions about policymakers' and scientists' COVID-19 responses. National Association for Research in Science Teaching (NARST) international conference. Vancouver, BC, March 27-30.
323. Clough, M. P., Olson, A. R., & Sobotka, A. J. (2022) Philosophy of science: The central issues for science education. Association for Science Teacher Education (ASTE) international conference. Greenville, SC, January 6-8.
322. Herman, B. C., Clough, M. P., Rao, A., Poor, S. V., Janney, B. A., Sobotka, A. J., Kidd, A. (2022) The influence of COVID-19 science perceptions and sociocultural membership on university biology students' COVID-19 decisions and policy support. Association for Science Teacher Education (ASTE) international conference. Greenville, SC, January 6-8.
321. Sobotka, A., Janney, B., Herman, B.C., Clough, M. P., Rao, A., Poor, S., Kidd, A. (2022) University biology students' perceptions of policymakers' and scientists' COVID-19 responses. Association for Science Teacher Education (ASTE) international conference. Greenville, SC, January 6-8.

2021

320. Clough, M. P. Philosophy of science and science education: Synergistic opportunities for public outreach.

Public Engagement with Science and Philosophy of Science. 3-Day Workshop, University of Cincinnati, April-May. [Keynote speaker](#).

319. Xu, Z.; Zhou, X.; Kogut, A.; & Clough, M. Incorporate research data management training into graduate education. Transformational Teaching and Learning Conference, Texas A&M University, College Station, TX. April 30.
318. Herman, B. C., Clough, M. P., Rao, A., Sobotka, A. J., & Olson, A. R. University biology students' pandemic decisions: The role of COVID-19 science beliefs and sociocultural membership. Proposal accepted for inclusion in the National Association for Research in Science Teaching (NARST) international conference. Orlando, FL, April 7-10.
317. Clough, M. P., Herman, B. C., Olson, A. R., & Sobotka, A. J. Impact of historical science stories on post-secondary biology students' NOS understanding and attitudes toward science. Proposal accepted for inclusion in the Association for Science Teacher Education international conference, Salt Lake City, UT, January 13-16.

2020

316. Clough, M. P. The nature of science in science education. Scientist in Every Florida School Summer Program. <https://www.floridamuseum.ufl.edu/earth-systems/scientist-in-every-florida-school/>, Florida Museum and the Thompson Earth Systems Institute, University of Florida, July 7. [Invited speaker](#).
315. Clough, M. P. Understanding the nature of science, technology, and engineering: The central aim of STEM education. Association for Science Teacher Education (ASTE) International Conference. San Antonio, TX, USA.
314. Stigers, C. A., Sobotka, A. J., Olson, A. R., & Clough, M. P. (2020). Institutional constraints to general reform-based science teaching: Implications for teacher preparation and professional development. Association for Science Teacher Education (ASTE) International Conference. San Antonio, TX, USA.

2019

313. Clough, M. P., Sobotka, A. J., Olson, A. R., Stigers, C. A. Incorporating inquiry in everyday instruction. Science Teachers Association of Texas Conference for the Advancement of Science Teaching, Dallas, TX, November 21-23.
312. Olson, A. R. & Clough, M. P. Practical strategies for troubleshooting and improving science lessons. Science Teachers Association of Texas Conference for the Advancement of Science Teaching, Dallas, TX, November 21-23.
311. Sobotka, A. J. & Clough, M. P. Concrete experiences for accurately portraying concepts of engineering. Science Teachers Association of Texas Conference for the Advancement of Science Teaching, Dallas, TX, November 21-23.
310. Pleasants, J. B., Clough, M. P., Olson, J. K., & Miller, G. Educating the public for informed technological decision-making. Society for the Philosophy of Technology International Conference, College Station, TX, May 19-22.
309. McComas, W. F., Clough, M. P., Enhancing nature of science (NOS) instruction through research-guided practices. National Association for Research in Science Teaching (NARST) International Conference, Baltimore, MD, March 31-April 3.
308. Yan, S., Xu, Z., & Clough, M. P. History of science in science education: Rationales, evidence, and implications for future research. National Association for Research in Science Teaching (NARST) International Conference, Baltimore, MD, March 31-April 3.

307. Olson, J. K., Clough, M. P., & McComas, W. F. STEM education and its unintended consequences on science teaching and learning. American Association for the Advancement of Science (AAAS) Meeting, Washington, DC, February 14-17.
306. Clough, M. P., Herman, B. C., & Olson, J. K. Preparing science teachers to overcome common obstacles and teach the nature of science. Association for Science Teacher Education (ASTE) International Conference, Savannah, GA, January 3-5.
305. Xu, Zhihong, Yan, S., & Clough, M. P. History of science in science education: Efforts, research, and implications for science teacher education. Association for Science Teacher Education (ASTE) International Conference, Savannah, GA, January 3-5.

2018

304. Macklem, G., Clough, M. P., Dagher, Z., Peterson, E., & Pence, C. Like somebody who has seen thousands of trees but has never seen a forest”: The critical role of history and philosophy of science in science education. History of Science Society/Philosophy of Science joint conference. Seattle, WA. November 1-4.
303. Kampourakis, K., Abd-El-Khalick, F., Akgun, S., Aksoz, B., Clough, M. P., Erduran, S., Kaya, E., Lederman, N. G., Lederman, J. S., McComas, W. F. Practical perspectives in teaching and learning nature of science. National Association of Research in Science Teaching International Conference. Atlanta, GA, March 10-13.
302. Pleasants, J., Clough, M. P., & Olson, J. K. Framing technological literacy: Questions worth exploring in STEM education. Paper presented at the Association for Science Teacher Education (ASTE) International Conference, Baltimore, MD, January 3-6.
301. Martin-Hansen, L., Hanuscin, D., Tillotson, J. W., Luft, J.A., Olson, J. K., & Clough, M. P. Creating next generation science standards-based experiences for future science teachers. Association for Science Teacher Education (ASTE) International Conference, Baltimore, MD, January 3-6.

2017

300. Clough, M. P. Impact of historical science stories on post-secondary biology students’ understanding of the nature of science. Western Michigan University Biology Department. [Invited seminar speaker](#).
299. Clough, M. P. Connecting science and engineering practices: A cautionary perspective. 2017 Elements of STEM Conference, Ankeny, IA. October 9th. [Invited featured speaker](#).
298. Olson, J. K. & Clough, M. P. Supporting science teachers. Massachusetts Principal Institute. July 16.
297. Clough, M. P., Herman, B. C., Hufnagel, E., Zeidler, D. L., Peel, A. N., Anderson, C. W., Shepardson, D. P., Johnson, W. R., Busch, K. C., McGinnis, J. R., & Branch, G. Symposium on teaching and learning about climate change: Framework for educators. NARST International Conference, San Antonio, TX, April 22-25.
296. Martin-Hansen, L., Hanuscin, D., Tillotson, J., Clough, M. P. & Olson, J. K. Bridging policy and practice—science teacher education for the next generation. National Science Teachers Association National Conference on Science Education. Los Angeles, CA., March 30-April 2
295. Clough, M. P. A course focused on restructuring science activities: Structure, activities and evidence of success. Association for Science Teacher Education (ASTE) International Conference, Des Moines, IA, January 12-14.

2016

294. Clough, M. P. The value of history and philosophy of science for science teacher education. Philosophy of Science Association Biennial Conference. Atlanta, GA, November 3-5.

293. Clough, M. P. Teaching about player and spectator ions through inquiry. Iowa Council of Teachers of Mathematics and Iowa Science Teaching Section Math Science Fall Conference, West Des Moines, IA, October 8-9.
292. Wilcox, J., Clough, M. P. & Kruse, J., How to effectively manage inquiry activities. Iowa Council of Teachers of Mathematics and Iowa Science Teaching Section Math Science Fall Conference, West Des Moines, IA, October 8-9.
291. Clough, M. P. & Olson, J. K. Structure of and instruction in a course that impacts preservice teachers understanding and teaching of the nature of science. Northcentral Association for Science Teacher Education (NASTE). Des Moines, IA, October 6-8.
290. Clough, M. P. & Olson, J. K. Teacher preparation matters! Teachers' classroom practices 2-5 years after having completed an intensive secondary science teacher education program. Association for Science Teacher Education (ASTE) International Conference, Reno, NV, January 7-9.
289. Zeidler, D., Kahn, S., Clough, M. P., Olson, J. K., Herman, B. C. & Newton, M. Humanitas Emptor: Reconsidering trends and policy in science teacher education. Association for Science Teacher Education (ASTE) International Conference, Reno, NV, January 7-9.
288. Wilcox, J., Ihrig, L., Clough, M. P. & Olson, J. K. Are beginning science teachers in over their heads? How beginning teachers handle the complexities of teaching science while facing institutional constraints. Association for Science Teacher Education (ASTE) International Conference, Reno, NV, January 7-9.

2015

287. Clough, M. P. The complexities of learning and teaching science. Department of Ecology, Evolution and Organismal Biology (EEOB) Biology Teaching Assistant Learning Community Seminar. December 2.
286. Clough, M. P. Structure and impact of a course designed to prepare teachers how to restructure science activities to be congruent with desired science education goals and how people learn. Northcentral Association for Science Teacher Education (NASTE). Peoria, IL, October 8-10.
285. Clough, M. P. Teaching science through inquiry in everyday instruction. Iowa Council of Teachers of Mathematics and Iowa Science Teaching Section Math Science Fall Conference, West Des Moines, IA, September 20- 21.
284. Wilcox, J. & Clough, M. P. Improving teaching practices to promote student learning of science practices. Iowa Council of Teachers of Mathematics and Iowa Science Teaching Section Math Science Fall Conference, West Des Moines, IA, September 20- 21.
283. Clough, M. P. Where did they get *those* ideas about science and scientists?! The value of history and nature of science instruction in post-secondary science education. University of Calgary, Calgary, Alberta, Canada, June 23.
282. Ihrig, L. M., Olson, J. K. & Clough, M. P. Impact of Socialization on Beginning Science Teachers' Pedagogical Decision Making and Science Instruction. National Association for Research in Science Teaching International Conference, Chicago, IL, April 11-14.
281. Abd-El-Khalick, F., Clough, M. P., Kampourakis, K., Kelly, G. J., Lederman, N. G., Osborne, Peters-Burton, E. E., Smith, M. U., Sherman-Heckler, W., Southerland, S. A. The Past, Present and Future of HPS-informed Science Education Research. Panel presentation. National Association for Research in Science Teaching International Conference, Chicago, IL, April 11-14.

280. Reid-Smith, J., Clough, M. P. & Olson, J. K. Integrating Historical Short Stories and the Nature of Science in Secondary Science Instruction: Teachers' Implementation Decisions and Students' Reactions. Association for Science Teacher Education (ASTE) International Conference, Portland, OR, January 7-10, 2015.
279. Berg, C. A., Ashmann, S., Clough, M. P. & Scolavino, R. An iPad App for Classroom Observation Data Collection and Teacher Development. Association for Science Teacher Education (ASTE) International Conference, Portland, OR, January 7-10, 2015.
278. Ihrig, L. M., Olson, J. K. & Clough, M. P. How the pedagogy of poverty and administrative power drove highly qualified and effective beginning science teachers from a NCLB turnaround school. Association for Science Teacher Education (ASTE) International Conference, Portland, OR, January 7-10, 2015.
277. Finson, K. D., Olson, J. K., Feldman, A., Bodzin, A. M., Emig, B., Miller, M. T., Krockover, G. H., Lee, H. & Clough, M. P. Application of Visual Data in K-16 Science Classrooms. Panel presentation at the Association for Science Teacher Education (ASTE) International Conference, Portland, OR, January 7-10, 2015.
276. Clough, M. P., Herman, B. C. & Olson, J. K. Nature of Science Classroom Observation Protocol (NOS-COP). Association for Science Teacher Education (ASTE) International Conference, Portland, OR, January 7-10, 2015.

2014

275. Olson, J. K. & Clough, M. P. The Nature of Science for Elementary Students. Iowa Council of Teachers of Mathematics and Iowa Science Teaching Section Math Science Fall Conference, Ames, IA, October 21-22.
274. Ihrig, L. M., Olson, J. K. & Clough, M. P. Glimpsing into the lives of beginning science teachers—their experiences may surprise you. Iowa Council of Teachers of Mathematics and Iowa Science Teaching Section Math Science Fall Conference, Ames, IA, October 21-22.
273. Clough, M. P. & Olson, J. K. NGSS and misconceptions regarding the crucial role of basic science. Iowa Council of Teachers of Mathematics and Iowa Science Teaching Section Math Science Fall Conference, Ames, IA, October 21-22.
272. Wilcox, J., Kruse, J. W. & Clough, M. P. Myths Regarding Teaching Science through Inquiry. Iowa Council of Teachers of Mathematics and Iowa Science Teaching Section Math Science Fall Conference, Ames, IA, October 21-22.
271. Clough, M. P. Standardizing Instruction and Institutionalizing Mediocrity. Northcentral Association for Science Teacher Education (NASTE). Eau Claire, WI, October 9-11.
270. Clough, M. P. Inquiry and History & Nature of Science Instruction: Why so rare? 10th International Conference on History of Science & Science Education. Minneapolis, MN, July 21-25.
269. Ihrig, L., Clough, M. P. & Olson, J. K. Effects of Formal and Informal Support Relationships on Experiences and Practices of First-year Science Teachers. National Association for Research in Science Teaching International Conference, Pittsburgh, PA, March 30-April 2.
268. Kruse, J. W., Clough, M. P., Olson, J. K. & Herman, B. C. The Nature of Technology: Implications for Learning, Teaching and Teacher Education. Association for Science Teacher Education (ASTE) International Conference, San Antonio, TX, January 15-19.
267. Ihrig, L., Wilcox, J., Olson, J. K. & Clough, M. P. I Bamboozled Them: How Novice Science Teachers Working to Implement Reforms-Based Instruction May Resist School Socialization. Association for Science Teacher Education (ASTE) International Conference, San Antonio, TX, January 15-19.

266. Smith, J. A. R. & Clough, M. P. Secondary Science Teachers' Classroom Implementation of Historical Science Stories Designed to Accurately Teach about the Nature of Science. Association for Science Teacher Education (ASTE) International Conference, San Antonio, TX, January 15-19.

2013

265. Clough, M. P. & Kruse, J. W. Integrating the Teaching of Science and the Nature of Science, Technology and Engineering. Iowa Council of Teachers of Mathematics and Iowa Science Teaching Section Math Science Fall Conference, Ames, IA, October 22-23.
264. Kruse, J. W., Clough, M. P. & Olson, J. K. Implications of the Nature of Technology for Science Education, Teacher Education, and Society. Northcentral Association for Science Teacher Education (NASTE) Regional Conference, Moline, IL, October 10-12.
263. Ihrig, L. M., Wilcox, J., Clough, M. P. & Olson, J. K. Superordinates in the Socialization of Novice Science Teachers Working to Implement Reforms-based Instruction. Northcentral Association for Science Teacher Education (NASTE) Regional Conference, Moline, IL, October 10-12.
262. Clough, M. P. Where Did They Get Those Ideas About Science and Scientists? The Important Role for History and Nature of Science in Post-Secondary Science Education. [Invited banquet speaker](#), Iowa Association of Community College Biology Teachers Conference, Iowa Falls, IA, September 27-28.
261. Clough, M. P., Olson, J. K., Ihrig, L. M., Wilcox, J., Herman, B. C. & Bergman, D. J. Structure and Efficacy of a Research-Based Science Teacher Education Program. STEM Teacher Educators' Conference, Des Moines, IA, September 20.
260. Herman, B. C., Clough, M. P., & Olson, J. K., (2013) NOS teaching practices and factors accounting for those practices: Implications for science teacher education. East-Asian Science Education Conference, Hong Kong, China, July 5.
259. Clough, M. P. Scientific Practices as a Foundation for Effectively Teaching Science Content, the Nature of Science, and the History of Science. [Presidential Address](#), International History, Philosophy and Science Teaching Conference, Pittsburgh, PA, USA, June 19-22.
258. Garik, P., Allchin, D., Clough, M. P. & Rudge, D. Outcomes of a Conference to Define a Research Agenda for Studying the Use of the History and Philosophy of Science in the Classroom. International History, Philosophy and Science Teaching Conference, Pittsburgh, PA, USA, June 19-22.
257. Clough, M. P. Issues and Pedagogical Practices in Teaching about the Nature of Technology. International History, Philosophy and Science Teaching Conference, Pittsburgh, PA, USA, June 19-22.
256. Herman, B. C., Clough, M. P. & Olson, J. K. Association between Experienced Teachers' NOS Implementation and Reform-Based Practices. International History, Philosophy and Science Teaching Conference, Pittsburgh, PA, USA, June 19-22.
255. Clough, M. P., Herman, B. C. & Olson, J. K. Factors Associated with Teachers' NOS Implementation Efforts: Implications for Science Teacher Preparation. Association for Science Teacher Education (ASTE) International Conference, Charleston, SC, January 9-12.
254. Smith, J. A. R., Clough, M. P. & Olson, J. K. The Impact of Nature of Science Short Stories on High School Science Students. Association for Science Teacher Education (ASTE) International Conference, Charleston, SC, January 9-12.
253. Olson, J. K., Smith, J. A. R. & Clough, M. P. Factors Influencing High School Science Teachers' use of Nature of Science Short Stories. Association for Science Teacher Education (ASTE) International Conference, Charleston, SC, January 9-12.

252. Ihrig, L. M., Wilcox, J., Olson, J. K. & Clough, M. P. Factors that Impact Reform-Oriented Practices of First Year Science Teachers. Association for Science Teacher Education (ASTE) International Conference, Charleston, SC, January 9-12.

2012

251. Clough, M. P. Teaching and Learning with History and Philosophy of Science. [Invited speaker](#). NSF Funded Conference: How Can the History and Philosophy of Science Contribute to Contemporary U.S. Science Education, Boston, MA, December 6-9.
250. Ihrig, L. M., Krumhardt, B. A., Clough, M. P. & Oglivie, C. Changing Students' Conceptions of the Nature of Science through Research and Reflection in a Foundations of Human Physiology Laboratory Course. National Association of Biology Teachers (NABT) Conference, Dallas, TX October 31-November 3.
249. Olson, J. K. & Clough, M. P. Engineering in the Science Standards: Opportunities and a Cautionary Note. Iowa Science Teachers Section (ISTS) Conference, Ames, IA, October 16. [Invited featured speakers](#).
248. Clough, M. P. The Social Responsibility to Accurately and Effectively Teach the Nature of Science. Iowa Science Teachers Section (ISTS) Conference, Ames, IA, October 16. [Invited featured speaker](#).
247. Taylor, J., Clough, M. P. & Kruse, J. W. Write for the *Iowa Science Teachers Journal (ISTJ)*. Iowa Science Teachers Section (ISTS) Conference, Ames, IA, October 16.
246. Clough, M. P. Educators' Responsibility to Understand and Teach about the Nature of Technology. Northcentral Association for Science Teacher Education (NASTE) Regional Conference, Cedar Falls, IA, October 11-13.
245. Clough, M. P. Effectively Teaching and Assessing the Nature of Science. National Science Teachers Association (NSTA) National Conference, Indianapolis, IN March 29-April 1.
244. Clough, M. P. Professional Development: The Need to Assess Yourself. National Science Teachers Association (NSTA) National Conference, Indianapolis, IN March 29-April 1.
243. Clough, M. P. The Nature of Science and Effective Chemistry Education. Guest presentation in Chem 555, Iowa State University, Ames, IA, March 27.
242. Herman, B. C., Clough, M. C. & Olson, J. K. Teachers' NOS implementation Practices Two to Five Years after Having Completed an Intensive Science Educational Program. Association for Science Teacher Education (ASTE) International Conference, Clearwater Beach, FL, January 4-7.

2011

241. Clough, M. P. The Story Behind the Science: Bringing Science and Scientists to Life in Postsecondary Science Education, Center for Excellence in Science, Mathematics and Engineering Education (CESMEE) STEM Education Brown Bag Seminar, December 12. [Invited speaker](#).
240. Clough, M. P. Presenter and consultant for the Des Moines School District Lab Report Development Task Force. Des Moines, IA, December 2. [Invited speaker](#).
239. Clough, M. P. Restructuring Secondary Science Activities. Iowa Science Teachers Section (ISTS) Conference, Ames, IA, October 18. [Invited featured speaker](#).
238. Kruse, J. W., Taylor, J. & Clough, M. P. Publish in the *Iowa Science Teachers Journal (ISTJ)*. Iowa Science Teachers Section (ISTS) Conference, Ames, IA, October 18.

237. Clough, Olson, J. K. & Kruse, J. W. The Nature of Technology: Implications for Learning and Teaching. Round Table presentation at the Northcentral Association for Science Teacher Education (NASTE) Regional Conference, Dubuque, IA, October 7-9.
236. Clough, M. P. & Kruse, J. W. A Professional Development Resource for Teaching Science As and Through Inquiry. Presented at the Northcentral Association for Science Teacher Education (NASTE) Regional Conference, Dubuque, IA, October 7-9.
235. Herman, B. C., Olson, J. K. & Clough, M. P. Experienced Science Teachers' Nature of Science Teaching Practices and Associated Factors Accounting for those Practices. National Association of Research in Science Teaching (NARST) International Conference in Orlando, FL, April 3-6.
234. Lederman, N. G., McComas, W. F., Lederman, J., Clough, M. P. & Southerland, S. A. Applying Research in the Science Classroom: An Overview of Approaches to Teaching Nature of Science. National Association of Research in Science Teaching (NARST) International Conference in Orlando, FL, April 3-6.
233. Clough, M. P. What is Science Inquiry and Why Teach It? Presentation to the Ruamrudee International School, Bangkok, Thailand, March 12. [Invited speaker.](#)
232. Clough, M. P. Designing and Teaching the Science Methods Course. University of Missouri, February 23 [Invited speaker.](#)
231. Herman, B. C., Clough, M. P. & Olson, J. K. Inservice Teachers' NOS Teaching Practices and Factors from their Preservice Program that Account for those Practices. Association for Science Teacher Education (ASTE) International Conference, Minneapolis, MN, January 19-22.
230. Clough, M. P., Herman, B. C. & Smith, J. A. R. Impact of Historical Short Stories on Post-Secondary Geology Students' NOS Understanding and Science Attitudes. Association for Science Teacher Education (ASTE) International Conference, Minneapolis, MN, January 19-22.

2010

229. Leonard, W., Clough, M. P., Rudge, D., McComas W. & Allchin, D. What is the Nature of Science of Biology? Four Different Perspectives. Panel Presentation. National Association of Biology Teachers (NABT) Professional Development Conference, Minneapolis, MN, November 3-6.
228. Clough, M. P. Impact of Historical Short Stories on Post-Secondary Biology Students' Understanding of the Nature of Science and Interest in Science. National Association of Biology Teachers (NABT) Professional Development Conference, Minneapolis, MN, November 3-6.
227. Clough, M. P. Seamlessly Teaching Biology Content and the Nature of Science. National Association of Biology Teachers (NABT) Professional Development Conference, Minneapolis, MN, November 3-6.
226. Clough, M. P. The Story Behind the Science: Bringing Science and Scientists to Life. University of Minnesota Education Colloquium, November 3, [Invited speaker.](#)
225. Clough, M. P. Structure and Efficacy of Historical Short Stories on Biology Majors Understanding of the Nature of Science and Interest in Science. Presentation for the Howard Hughes Medical Institute Biology Faculty Learning Community, Iowa State University, November 2.
224. Clough, M. P. The Nature of Science: Implications for Teaching and Learning Science in the Laboratory. Presentation for the Howard Hughes Medical Institute Laboratory Learning Faculty Learning Community, Iowa State University, October 13.
223. Clough, M. P. Strategies for Assessing Students' Understanding of the Nature of Science. Iowa Science Teachers Section (ISTS) Conference, Ames, IA, October 8.

222. Kruse, J. W., Clough, M. P. & Taylor, J. M. Publish in the *Iowa Science Teacher Journal (ISTJ)*. Iowa Science Teachers Section (ISTS) Conference, Ames, IA, October 8.
221. Clough, M. P. Laboratory Classes: Impact of Historical Science Short Stories on College Biology Majors' Nature of Science Understanding and Attitudes toward Science Biology Learning and Teaching Group, Iowa State University, Ames, IA, April 7.
220. Clough, M. P. Making Explicit the Teacher's Role in Inquiry Teaching: A Professional Development Resource for Inservice and Preservice Teachers. Association for Science Teacher Education (ASTE) National Conference, Sacramento, CA, January 14-16.
219. Clough, M. P., Herman, B. C. & Smith, J. A. R. Seamlessly Teaching Science Content and the Nature of Science. Association for Science Teacher Education (ASTE) National Conference, Sacramento, CA, January 14-16.
218. Herman, B. C. & Clough, M. P. Accurately Conveying to Pre-Service Teachers Methodological Pluralism and an Accurate Understanding of the Nature of Science Through Secondary Science Activities. Association for Science Teacher Education (ASTE) National Conference, Sacramento, CA, January 14-16.
217. Smith, J. A. R., Clough, M. P. & Herman, B. C. Efficacy of Historical Narratives in a High School Biology Classroom. Association for Science Teacher Education (ASTE) National Conference, Sacramento, CA, January 14-16.

2009

216. Clough, M. P. Humanizing Science to Improve Secondary Science Education. Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 28.
215. Kruse, J. W., Clough, M. P. & Taylor, J. M. Publish in the *Iowa Science Teacher Journal (ISTJ)*. Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 28.
214. Smith, J. A. R., Clough, M. P. & Herman, B.C. Impact of Historical Short Stories in a 10th Grade Biology Course. Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 28.
213. Clough, M. P. The Story Behind the Science: Bringing Science and Scientists to Life in Post-Secondary Science Education. Northcentral Association for Science Teacher Education (NASTE) Regional Conference, Dubuque, IA, October 8-10.
212. Clough, M. P., Berg, C. A. & Olson, J. K. Promoting Effective Science Teacher Education and Science Teaching: A Framework for Teacher Decision-Making. Northcentral Association for Science Teacher Education (NASTE) Regional Conference, Dubuque, IA, October 8-10.
211. Smith, J. A. R., Clough, M. P. & Herman, B.C. Efficacy of and Students' Reaction to Historical Short Stories in a 10th Grade Biology Course. Northcentral Association for Science Teacher Education (NASTE) Regional Conference, Dubuque, IA, October 8-10.
210. Kruse, J. W., Clough, M. P., Olson, J. K. & Colbert, J. Student and Instructor Reaction to the Use of Historical Short Stories in a Post-Secondary Introductory Biology Course. 10th International History, Philosophy of Science in Science Teaching (IHPST) Conference, Notre Dame, IN, June 24-28.
209. Clough, M. P., Herman, B. C., Kruse, J. W. & Kerton, C. Instructor and Student Response to the Use of Historical Short Stories in an Introductory Post-Secondary Astronomy Course. 10th International History, Philosophy of Science in Science Teaching (IHPST) Conference, Notre Dame, IN, June 24-28.

208. Kruse, J. W., Clough, M. P., Olson, J. K. & Colbert, J. Impact of Historical Short Stories on College Biology Majors' Nature of Science Conceptions. 10th International History, Philosophy of Science in Science Teaching (IHPST) Conference, Notre Dame, IN, June 24-28.
207. Clough, M. P. Humanizing Science to Improve Post-Secondary Science Education. 10th International History, Philosophy of Science in Science Teaching (IHPST) Conference, Notre Dame, IN, June 24-28.
206. Azzaz, A., Clark, F, Clough, M. P., Ingebriksen, T., & Pleasants, B. Darwin and Me: A panel discussion on science and religion. Iowa State University, February 12.
205. Kruse, J. W., Clough, M. P. & Olson, J. K. Student and Instructor Reactions to the Use of Historical Short Stories in a Post-Secondary Introductory Biology Course. Association for Science Teacher Education (ASTE) National Conference, Hartford, CT, January 8-10.

2008

204. Clough, M. P., Olson, J. K. & Herman, B. C. The Nature of Science: Its Crucial Role in Teaching Science Content. Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 23.
203. Clough, M. P. & Taylor, J. M. Publish in the *Iowa Science Teacher Journal (ISTJ)*. Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 23.
202. Bergman, D. J., Clough, M. P., Olson, J. K. and Kruse, J. W. Eating Their Young: Beginning Teachers and Fierce Institutional Constraints. Academy for Educational Studies Conference, Branson, MO, October 20-21.
201. Clough, M. P. The Learning Cycle: 30+ Years later. Northcentral Association for Science Teacher Education (NASTE) Regional Conference, Winona, MN, October 9-11.
200. Olson, J. K. & Clough, M. P. Increasing Students' Mental Engagement. Center for Excellence in Teaching and Learning University Teaching Seminar. Iowa State University, Scheman Building, August 19.
199. Olson, J. K., Clough, M. P., Vanderlinden, D. W. & Kruse, J. W. Should "Proof" and "Truth" Be Targeted First? Evidence for Addressing Some Nature of Science Concepts and Misconceptions Earlier Than Others. National Association for Research in Science Teaching International Conference, Baltimore, MD, March 30 – April 2.
198. Clough, M. P. Structure and Efficacy of a Redesigned Secondary Science Teacher Education Program. Presentation at the Friday Educational Institute, North Carolina State University, Raleigh, NC, March 12, [Invited speaker](#).
197. Olson, J. K., Clough, M. P., & Vanderlinden, D. The Entangled Nature of Students' Nature of Science Conceptions. Association for Science Teacher Education (ASTE) National Conference in St. Louis, MO, January 10-12.
196. Clough, M. P., Bergman, D. J., Olson, J. K., Kruse, J., Berg, C.A. Eating Their Young: New Teachers and Fierce Institutional Constraints. Association for Science Teacher Education (ASTE) National Conference in St. Louis, MO, January 10-12.

2007

195. Clough, M. P. & Taylor, J. M. Publish in the *Iowa Science Teacher Journal (ISTJ)*. Iowa Science Teachers Section (ISTS) Conference, Cedar Rapids, IA, October 18.
194. Clough, M. P. To What Extent is Accurate and Effective Nature of Science Instruction Achievable? Northcentral Association for Science Teacher Education (NASTE) Regional Conference, Madison, WI, October 11-13.

193. Clough, M. P. & Olson, J. K. The Nature of Science: Implications for the Learning and Teaching of Science. Conference on Understanding the Nature of Science. University of Manitoba, Winnipeg, Canada. September 22. [Invited speakers](#).
192. Clough, M. P. The Nature of Science: Implications for Teaching and Learning Science. Presentation for the Academies Creating Teacher Scientists (ACTS) program funded by the U.S. Department of Energy, Office of Science. Iowa State University, July 10. [Invited speaker](#).
191. Clough, M. P., Olson, J.K., DeBerg, K, McComas, W. F., Ryder, J. Teaching and Assessing the Nature of Science: Issues and Complexities. [Plenary Session](#). 9th International History, Philosophy of Science in Science Teaching (IHPST) Conference, Calgary, Canada, June 24-27.
190. Metz, D., Klassen, S., McMillan, B., Clough, M. & Olson, J. Science Stories: One Size Doesn't Fit All, [Plenary Session](#). 9th International History, Philosophy of Science in Science Teaching (IHPST) Conference, Calgary, Canada, June 24-27.
189. Olson, J. K. & Clough, M. P. Undergraduates' NOS Conceptions and the Role of Historical Narratives: A Very Tangled Web. 9th International History, Philosophy of Science in Science Teaching (IHPST) Conference, Calgary, Canada, June 24-27.
188. Clough, M. P. Laboratory Classes: Indispensable experiences for learning science or a waste of time, resources and space? Biology Learning and Teaching Group, Iowa State University, Ames, IA, January 29. [Invited speaker](#).
187. Clough, M. P., Olson, J. K., Vanderlinden, D. W. & Bruxvoort, C. N. The Impact of Historical Short Stories on Post-Secondary Biology and Geology Students' Understanding of Science Content and the Nature of Science. Association for Science Teacher Education (ASTE) National Conference in Clearwater Beach, FL, January 3-7.

2006

186. Clough, M. P. Science and Religion: The Unnecessary Conflict. Iowa State University College For Senior: A Program of Lifelong Learning For All Persons Age 50 and Above. Ames, IA, November 7. [Invited speaker](#).
185. Clough, M. P. & Olson, J. K. Humanizing Science to Improve the Teaching and Learning of Biology Content. National Science Teachers Association (NSTA) Regional Conference in Omaha, NE, October 19-21.
184. Clough, M. P. & Taylor, J. M. Publish in the *Iowa Science Teacher Journal (ISTJ)*. Iowa Science Teachers Section (ISTS) Conference, Cedar Rapids, IA, October 18.
183. Clough, M. P. Humanizing Science to Improve Post-Secondary Science Education. Poster presentation at the Northcentral Association for Science Teacher Education (NASTE). Eau Claire, WI, October 5-7.
182. Berg, C. A. & Clough M. P. "Alternative" Still Requires Reaching Your Destination: A Visual Framework for Teacher Decision-Making. STEM ACT Conference, Arlington, VA. May 5-7, 2006.
181. Clough, M. P. & Olson, J. K. Humanizing Science to Improve the Teaching and Learning of Biology Content. National Science Teachers Association (NSTA) National Conference in Anaheim, CA, April 6-9.
180. Clough, M. P. & Olson, J. K. Humanizing Science to Improve the Teaching and Learning of Chemistry Content. National Science Teachers Association (NSTA) National Conference in Anaheim, CA, April 6-9.
179. Clough, M. P. & Berg, C. A. Visual Framework for Promoting Effective Science Teaching and Science Teacher Education. Association for Science Teacher Education (ASTE) National Conference in Portland, OR, January 12-15.

178. Clough, M. P. Teaching the Nature of Science: Questions Rather Than Tenets. Association for Science Teacher Education (ASTE) National Conference in Portland, OR, January 12-15.
177. Clough, M. P., Olson, J. K., Bruxvoort, C. N. & Vanderlinden, D. W. The Impact of Historical Short Stories on Students' Understanding of Issues in the Nature of Science. Association for Science Teacher Education (ASTE) National Conference in Portland, OR, January 12-15.

2005

176. Clough, M. P. & Olson, J. K. Humanizing Science to Improve the Learning of Biology Content. Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 20.
175. Clough, M. P. & Taylor, J. M. The New Electronic *Iowa Science Teacher Journal (ISTJ)*. Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 20.
174. Cervato, C., Clough, M. P., Colbert, J., Olson, J. K & Wilson, D. Humanizing Science to Improve Undergraduate Geoscience Education: Short Stories on Geological Time. Poster presentation at the Geological Society of America Conference, Salt Lake City, UT. October 16-19.
173. Clough, M. P. Teaching the Nature of Science: Questions Rather than Tenets. Poster presentation at the Northcentral Association for Science Teacher Education (NASTE). Cedar Falls, IA, October 6-8.
172. Clough, M. P. Engaging Students in Specialized Small Classroom Environments. Center for Excellence in Learning & Teaching fall retreat, Springbrook Conservation Education Center, September 23-25. [Invited speaker](#).
171. Olson, J. K., Clough, M. P., Ford, M. J., Ryder, J. & Leach, J. Symposium on Teaching and Assessing the Nature of Science. 8th International History, Philosophy & Science Teaching (IHPST) Conference, Leeds, England, July 15 - July 18.
170. Metz, D., Klassen, S., McMillan, B., Clough, M. P. & Olson, J. K. Building a Foundation for the Use of Historical Narratives. 8th International History, Philosophy & Science Teaching (IHPST) Conference, Leeds, England, July 15 - July 18.
169. Olson, J. K., Clough, M. P., Bruxvoort, C. N. & Vanderlinden, D. W. Improving Students' NOS Understanding through Historical Short Stories in College Level Introductory Geology and Biology Courses. 8th International History, Philosophy & Science Teaching (IHPST) Conference, Leeds, England, July 15-18.
168. Clough, M. P. Teaching the Nature of Science to Secondary and Post-Secondary Students: Questions Rather than Tenets. 8th International History, Philosophy & Science Teaching (IHPST) Conference, Leeds, England, July 15-18.
167. Clough, M. P. Teaching the Nature of Science: The Role of History and Philosophy of Science. Notre Dame Graduate Program in History and Philosophy of Science, University of Notre Dame, IN, May 21, [Invited speaker](#).
166. Clough, M. P., Olson, J. K., Madsen, A. J. & Taylor, J. M. It's the Nature of Learning Content: Empirical Evidence for the Primacy of the Nature of Science in Science Learning. National Association of Research in Science Teaching (NARST) International Conference in Dallas, TX, April 4-7.
165. Clough, M. P. & Olson, J. K. Humanizing Science to Improve the Teaching and Learning of Science Content. National Science Teachers Association (NSTA) National Conference, Dallas, TX, March 31 - April 3.

164. Clough, M. P., Olson, J. K., Madsen, A. J., & Taylor, J. M. No Matter Where You Go, There You Are: The Primacy of the Nature of Science in Science Literacy. Association for the Education of Teachers in Science (AETS) National Conference in Colorado Springs, CO, January 13-16.

2004

163. Williams, M. & Clough, M. P. Humanizing Science to Improve the Teaching and Learning of Earth Science Content. Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 21.
162. Colbert, J., Clough, M. P. & Olson, J. K. BETAL: Bridging the Gap between Biology and Pedagogy. Presentation at the Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 21.
161. Clough, M. P. Learners' Responses to the Demands of Conceptual Change: Additional Considerations for Effective Nature of Science Instruction. North Central Association for the Education of Teachers in Science (NC-AETS) Regional Conference in Dubuque, IA, October 7-9.
160. Clough, M. P., Olson, J. K., Madsen, A. J., & Taylor, J. M. No Matter Where You Go, There You Are: The Nature of Science. North Central Association for the Education of Teachers in Science (NC-AETS) Regional Conference in Dubuque, IA, October 7-9.
159. Colbert, J., Clough, M. P. & Olson, J. K. Biology Education Teaching and Learning: Bridging the Gap Between Biology and Pedagogy. 6th Annual Iowa State University Learning Communities Institute, Ames, IA.
158. Clough, M. P. & Olson, J. K. But what was the treatment? An explicit analysis of a NOS course used as a treatment in NOS research. National Association for Research in Science Teaching (NARST) Conference, Vancouver, British Columbia, Canada, April 1-4.
157. Olson, J. K., Madsen, A. J., Bruxvoort, C. N. & Clough, M. P. The Effect of Problem-Based Learning Video Case Content on Preservice Elementary Teachers' Conceptions of Teaching. National Association for Research in Science Teaching (NARST) Conference, Vancouver, British Columbia, Canada, April 1-4.
156. Olson, J. K., Clough, M. P., Madsen, A. J., Bruxvoort, C. N. & Numedahl, P. J. Using Oral Defenses in Science Methods Classes. Association for the Education of Teachers in Science (AETS) National Conference, Nashville, TN, January 7-11.
155. Clough, M. P., Olson, J. K. & Hand, B. M. Rationale, Design and Development of a Master of Arts in Teaching Program. Association for the Education of Teachers in Science (AETS) National Conference, Nashville, TN, January 7-11.

2003

154. Williams, M., Clough, M. P. & Olson, J. K. Who "Discovered" the Atom? Improving Understanding of Science Content with Activities and the History of Science. Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 16.
153. Clough, M. P., Olson, J. K. & Williams, M. Humanizing Science to Improve the Teaching and Learning of Content. Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 16.
152. Clough, M. P. Understanding the Complexities in Learning and Teaching Science: The Value of a Research-Based Framework. North Central Association for the Education of Teachers in Science (NC-AETS) Regional Conference in Rochester, MN, October 2-4.
151. Clough, M. P. & Olson, J. K. Design of a Master of Arts in Teaching (M.A.T.) Program to Attract and Prepare Effective Science Teachers. North Central Association for the Education of Teachers in Science (NC-AETS) Regional Conference in Rochester, MN, October 2-4.

150. Bruxvoort, C. N., Olson, J. K., Clough, M. P. & Vanderlinden, D. Assessment of Teachers' Understandings of Effective Nature of Science Instruction: Teachers' Thinking and Implications for Research Methodology. 7th International History, Philosophy & Science Teaching (IHPST) Conference, Winnipeg, Canada, July 30 - August 3.
149. Olson, J. K. & Clough, M. P. Opening the Black Box of Nature of Science Instruction. 7th International History, Philosophy & Science Teaching (IHPST) Conference, Winnipeg, Canada, July 30 - August 3.
148. Clough, M. P. Explicit But Insufficient: Additional Considerations for Effective Nature of Science Instruction. 7th International History, Philosophy & Science Teaching (IHPST) Conference, Winnipeg, Canada, July 30 - August 3.
147. Olson, J. K. & Clough, M. P. Effects of Contextualized and Decontextualized Nature of Science Instruction on Teachers' Practice. AERA International Conference in Chicago, IL, April 21-25.
146. Hand, B. M., Bintz, J., Olson, J.K. & Clough, M. P. Developing Partnerships with Schools: How To Undertake the Process. Presentation at the Association for the Education of Teachers in Science (AETS) National Conference, St. Louis, MO, January 29 - February 2.
145. Harris, R. L., Penick, J. E., Bonnsetter, R., Daas, P. M., Enger, S., Tillotson, J. W., Varrella, . F., Veronesi, P., Weld, J., Clough, M. P. & Olson, J. K. Rational Papers in Methods Courses. Panel Discussion at the Association for the Education of Teachers in Science (AETS) National Conference, St. Louis, MO, January 29 - February 2.
144. Olson, J. K., Clough, M. P., Vanderlinden, D. & Bruxvoort, C. N. (2003). Methodological Issues in Assessing Nature of Science Understandings through the Use of Writing Tasks. Association for the Education of Teachers in Science (AETS) National Conference, St. Louis, MO, January 29 - February 2.
143. Clough, M. P., Madsen, A. J., Williams, M., Bruxvoordt, C. N & Vanderlinden, D. W. Student Teacher Supervision Practices Consistent With a Research-Based Framework For Teaching Science. Association for the Education of Teachers in Science (AETS) National Conference, St. Louis, MO, January 29 - February 2.
142. Clough, M. P. Structure of a Secondary Science Methods Course Promoting and Reflecting a Research-Based Framework for Teaching Science. Association for the Education of Teachers in Science (AETS) National Conference, St. Louis, MO, January 29 - February 2.
141. Clough, M. P. Understanding the Complexities of Learning and Teaching Science: The Value of a Research-Based Framework. Association for the Education of Teachers in Science (AETS) National Conference, St. Louis, MO, January 29 - February 2.
140. Clough, M. P. Explicit but Insufficient: Additional Considerations for Successful NOS Instruction. Association for the Education of Teachers in Science (AETS) National Conference, St. Louis, MO, January 29 - February 2.

2002

139. Clough, M. P., Olson, J. K., Vanderlinden, D. W. & Bruxvoort, C. N. Compelling Rationales and Strategies for Teaching the Nature of Science. Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 17.
138. Olson, J. K & Clough, M. P. Technology's Tendency to Undermine Serious Study and Teaching. Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 17.
137. Olson, J. K., Bruxvoordt, C. N., Vanderlinden, D. W. & Clough, M. P. Assessing Nature of Science Understanding with Writing Instruments: Issues and Strategies. North Central Association for the Education of Teachers in Science (NC-AETS) Regional Conference in Bettendorf, IA, October 3-5.

136. Clough, M. P. Student Teacher Supervision Practices Consistent with a Research-Based Framework for Teaching Science. North Central Association for the Education of Teachers in Science (NC-AETS) Regional Conference in Bettendorf, IA, October 3-5.
135. Colburn, A., Henriques, L. & Clough, M. P. Science, Creationism & Religion: Responses From the Clergy. Association for the Education of Teachers in Science (AETS) National Conference, Charlotte, NC, January 10-13.
134. Olson, J. K. & Clough, M. P. Technology's Tendency to Undermine Serious Study and Teaching. Association for the Education of Teachers in Science (AETS) National Conference, Charlotte, NC, January 10-13.

2001

133. Olson, J. K. & Clough, M. P. Secondary Science Teachers' Implementation Practices Following a Course Emphasizing Contextualized & Decontextualized Nature of Science Instruction. 6th International History, Philosophy & Science Teaching (IHPST) Conference with the History of Science Society, Denver, CO, November 7-11, 2001.
132. Clough, M. P. & Olson, J. K. Structure of a Course Promoting Contextualized and Decontextualized Nature of Science Instruction. 6th International History, Philosophy & Science Teaching (IHPST) Conference with the History of Science Society, Denver, CO, November 7-11.
131. Clough, M. P. Longitudinal Understanding of the Nature of Science Following a Course Emphasizing Contextualized & Decontextualized Nature of Science Instruction. 6th International History, Philosophy & Science Teaching (IHPST) Conference with the History of Science Society, Denver, CO, November 7-11, 2001.
130. Clough, M. P. & Hand, B. M. Teachers Helping Teachers: An NSF Proposal to Create a Science Teacher Mentoring Program in Iowa. Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 18.
129. Clough, M. P. & Olson, J. K. Reconstructing Science Activities. Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 18.
128. Olson, J. K. & Clough, M. P. Technology's Tendency to Undermine Serious Study. North Central Association for the Education of Teachers in Science (NC-AETS) Regional Conference in Madison, WI, October 11-13.
127. Clough, M. P. & Olson, J. K. Effects of Contextualized & Decontextualized Nature of Science Instruction on Teachers' Classroom Implementation Practices. National Association for Research in Science Teaching (NARST) Conference, St. Louis, MO, March 25-28.
126. Numedahl, P. J. & Clough, M. P. Conceptions of Learning and Teaching Expressed by Students at Two Stages in Their Preservice Program. National Association for Research in Science Teaching (NARST) Conference, St. Louis, MO, March 25-28.
125. Clough, M. P., Olson, J. K., Beisel, M. & Robinson, C. Characteristics of a Nature of Science Course That Impact Teachers' Implementation Practices. AETS Program Presentation at the National Science Teachers Association (NSTA) National Conference, St. Louis, MO, March 22-25.
124. Olson, J. K. & Clough, M. P. Teaching the Nature of Science to Elementary Students. National Science Teachers Association (NSTA) National Conference, St. Louis, MO, March 22-25.
123. Penick, J. E., Berg, C. A., Clough, M. P. & Bonnsetter, R. Preparing Teachers With a Research-Based Rationale For Teaching Science. AACTE National Conference, Dallas, TX, March 1-4.

122. Clough, M. P., Olson, J. K., Hand, B. M., Numedahl, P. J., Penick, J. E. & Berg, C. A. Research-Based Framework: Directions for Researchers. Association for the Education of Teachers in Science (AETS) National Conference Costa Mesa, CA, January 18-21.
121. Numedahl, P. J. & Clough, M. P. Explicit and Tacit Conceptions of Teaching and Learning Expressed by Students Experiencing a Second and Third Science Methods Course: Implications for the Structure of Preservice Science Teacher Education Programs. Association for the Education of Teachers in Science (AETS) National Conference Costa Mesa, CA, January 18-21.
120. Olson, J. K. & Clough, M. P. Contextualized Nature of Science Instruction: A Success Story. Association for the Education of Teachers in Science (AETS) National Conference, Costa Mesa, CA, January 18-21.

2000

119. Martin, L. & Clough, M. P. Teaching Evolution in the Classroom—Helping Students Understand the Nature of Science. Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 26.
118. Clough, M. P., Olson, J. K. & Robinson, C. Teaching the Nature of Science to Secondary Students. Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 26.
117. Olson, J. K. & Clough, M. P. Teaching the Nature of Science to Elementary Students. Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 26.
116. Clough, M. P. The Nature of Science: Understanding how the “game” of science is played. North Central Association for the Education of Teachers in Science (NC-AETS) Regional Conference in Eau Claire, WI, October 12-14.
115. Clough, M. P. Diminishing Students’ Resistance to Biological Evolution Education. Anthropology Section and Iowa Science Teachers Section Symposium Addressing Evolution and the Classroom Teacher. Iowa Academy of Science Conference, Des Moines, IA, April 21-22. [Invited Panel Participant](#).
114. Clough, M. P. & Olson, J. K. Evaluation of a Teacher Education Course Emphasizing Explicit Decontextualized and Contextualized Nature of Science Instruction. Iowa Academy of Science Conference, Des Moines, IA, April 21-22.
113. Clough, M. P. & Olson, J. K. Beyond Discrepant Events: Keeping the Heat on Students' Misconceptions Regarding the Nature of Science. National Science Teachers Association (NSTA) National Conference in Orlando, FL, April 6-9.
112. Olson, J. K. & Clough, M. P. No, You *Can't* Stop Thinking! AETS program presentation in the National Science Teachers Association (NSTA) National Conference in Orlando, FL, April 6-9.
111. Clough, M. P., Numedahl, P. J. & Berg, C. A. Explicit and Tacit Conceptions of Teaching and Learning Expressed by Students in a Model Science Teacher Education Program. Association for the Education of Teachers in Science (AETS) National Conference, Akron, OH, January 6-9.
110. Clough, M. P. The Unnatural Creative and Inventive Character of Science and its Implications for Teaching and Learning Science Content and Processes. Association for the Education of Teachers in Science (AETS) National Conference, Akron, OH, January 6-9.

1999

109. Olson, J. K. & Clough, M. P. Engaging Students Who Attempt to Exit From Cognitively Demanding Tasks. Des Moines Independent School District, Des Moines, IA, November. [Invited speakers](#).

108. Clough, M. P. The Unnatural Nature of Science: Implications for Science Teaching and Science Teacher Education. North Central Association for the Education of Teachers in Science (NC-AETS) Regional Conference in Eau Claire, WI, September 30 to October 2.
107. Clough, M. P. & Berg, C. A. Explicit and Tacit Conceptions of Teaching and Learning Expressed by Students in a Model Science Teacher Education Program. North Central Association for the Education of Teachers in Science (NC-AETS) Regional Conference in Eau Claire, WI, September 30 to October 2.
106. Olson, J. K. & Clough, M. P. Preparing Teachers to Maintain Student Engagement in Cognitively Demanding Tasks. North Central Association for the Education of Teachers in Science (NC-AETS) Regional Conference in Eau Claire, WI, September 30 to October 2.
105. Olson, J. K., Clough, M. P. & Frist, S. Engaging Students Who Attempt to Exit from Cognitively Demanding Tasks. Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 14.
104. Clough, M. P., Olson, J. K. & Beisel, M. The Role of the Teacher and Science Activities in Accurately Portraying the Nature of Science. Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 14.
103. Clough, M. P. Science For *All* Americans? Iowa Academy of Science Conference, Ames, IA, April 23-24.
102. Clough, M. P. Practical Strategies for Teaching the Nature of Science to Middle and High School Students. California State University at Long Beach, Long Beach, CA, March 16. [Invited speaker](#).
101. Clough, M. P. Preparing Science Teachers Who Can Persuasively Explain Their Teaching Strategies. Association for the Education of Teachers in Science (AETS) National Conference, Austin, TX, January 14-17.
100. Clough, M. P. Science For *All* Americans? Association for the Education of Teachers in Science (AETS) National Conference, Austin, TX, January 14-17.

1998

99. Clough, M. P. Longitudinal Understanding of the Nature of Science Facilitated by an Introductory Biology Course—Implications for High School Science Teaching. Iowa State Science and Mathematics Center Seminar, October 23. [Invited speaker](#).
98. Clough, M. P. Distinguishing Between Players and Spectators—Modifying Laboratory Activities So They Engender Student Thinking. Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 22.
97. Clough, M. P. Student Teachers' Perceptions Regarding Preservice NOS Instruction and its implementation in Secondary Science Teaching. Association for the Education of Teachers in Science (AETS) National Meeting, Minneapolis, MN, January 8-11.
96. Clough, M. P. Using Internet for Extensive Dialogue Regarding Critical Incidents in Science Teaching. Association for the Education of Teachers in Science (AETS) National Conference, Minneapolis, MN, January 8-11.
95. Richardson, L., Simmons, P. E., Clough, M. P., & Dantonio, M. Influence of Modeling Constructivist Learning Environments on Preservice Science Teachers. Association for the Education of Teachers in Science (AETS) National Conference, Minneapolis, MN, January 8-11.
94. McComas, W. F., Lederman, N. G. & Clough, M. P. The Nature of Science in Science Education: Rationales and Strategies. Association for the Education of Teachers in Science (AETS) National Conference, Minneapolis, MN, January 8-11.

1997

93. Beisel, M. & Clough, M. P. The Nature of Science: Its Vital Role in the Science Classroom, and How Teachers Can Explicitly Address it. Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 23.
92. Clough, M. P. Activities that Help Eliminate Misconceptions and Teleological Explanations Regarding Diffusion and Osmosis. Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 23.
91. Clough, M. P. A Running Aquatic Ecosystem Inside Your Classroom. Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 23.
90. Clough, M. P. & Berg, C. A. Critter Condos and Critical Thinking. National Association of Biology Teachers (NABT) National Conference, Minneapolis, MN, October 8-11.
89. Clough, M. P. & Clough, S. J. *BioCom Biology: A Community Context*. National Association of Biology Teachers (NABT) National Conference, Minneapolis, MN, October 8-11.
88. Berg, C. A., Clark, S., & Clough, M. P. Condos, Critters and Critical Thinking. Wisconsin Society of Science Teachers (WSST) Conference, Milwaukee, WI, April 10-12.
87. Clough, M. P. & Pawinski, J. Distinguishing Between Players and Spectators. Wisconsin Society of Science Teachers (WSST) Conference, Milwaukee, WI, April 10-12.
86. Clough, M. P. *BioCom Biology: A Community Context*. Wisconsin Society of Science Teachers (WSST) Conference, Milwaukee, WI, April 10-12.
85. Clough, M. P., Pawinski, J. & Berg, C. A. Constructivist Chemistry/Physical Science Lab Activity. National Science Teachers Association (NSTA) National Conference, New Orleans, LA, April 3-6.
84. Clough, M. P. Longitudinal Understanding of the Nature of Science Facilitated by an Introductory Biology Course. National Association for Research in Science Teaching (NARST) Conference, Chicago, IL, March 21-24.
83. Clough, M. P. & Berg, C. A. Key Articles and Experiences for Students Developing a Research-Based Framework For Teaching Science. Association for the Education of Teachers in Science (AETS) National Conference, Cincinnati, OH, January 9-12.
82. Berg, C. A. & Clough, M. P. Teach Until It Hurts: Or What Does It Take to Affect Change. Association for the Education of Teachers in Science (AETS) National Conference, Cincinnati, OH, January 9-12.

1996

81. Clough, M. P. *Biology: A Community Context—A New Approach to Biology Education*. Pennsylvania Science Teachers Association, State College, PA, December 5-6.
80. Clough, M. P. Longitudinal Understanding of the Nature of Science Facilitated by an Introductory High School Biology Course. Science Education Seminar, Science Education Center, The University of Iowa, Iowa City, IA, November 20.
79. Clough, Michael P. & Clough, S. J. Linking Constructivism, Active Learning, and Performance Assessment. Wisconsin Association for Supervision and Curriculum Development (WASCD) Institute, Eau Claire, WI, November 13. [Invited speakers](#).
78. Clough, M. P. & Berg, C. A. Key Articles and Experiences for Students Developing a Research-Based Framework for Teaching Science. North Central Association for the Education of Teachers in Science (NC-AETS) Regional Conference, Iowa City, IA, October 10-12.

77. Clough, M. P. The Necessary Role for History, Philosophy, and Sociology of Science Instruction in Undergraduate and Graduate Level Science Teacher Education. North Central Association for the Education of Teachers in Science (NC-AETS) Regional Conference, Iowa City, IA, October 10-12.
76. Clough, M. P. Preparing Science Teachers to Develop and Implement Mentally Engaging Lab Activities. North Central Association for the Education of Teachers in Science (NC-AETS) Regional Conference, Iowa City, IA, October 10-12.
75. Johnson, R. & Clough, M. P. Activities and Strategies to Promote Environmental Education. Northwestern Wisconsin Education Association (NWEA) Conference, Eau Claire, WI, October 10. [Invited speakers.](#)
74. Berg, C. A., Clough, M. P. & Pawinski, J. Critter Condos and Critical Thinking. Wisconsin Society of Science Teachers (WSST) Conference, Fond du Lac, WI, April 11-13.
73. Clough, M. P. & Clark, R. L. Activities and Strategies to Facilitate Long-term Positive Changes in Your Students' Understanding of the Nature of Science. Wisconsin Society of Science Teachers (WSST) Conference, Fond du Lac, WI, April 11-13.
72. Clough, M. P. & Clark, R. L. How to Develop and Implement Constructivist Lab Activities. Wisconsin Society of Science Teachers (WSST) Conference, Fond du Lac, WI, April 11-13.
71. Clark, R. L. & Clough, M. P. Students as Investigators: An Environmental Problem Solving Activity. National Science Teachers Association (NSTA) National Conference, St. Louis, MO, March 28-31.
70. Clark, R. L. & Clough, M. P. A Constructivist Approach to the Mass Percent of Water in a Hydrate. National Science Teachers Association (NSTA) National Conference, St. Louis, MO, March 28-31.
69. Clough, M. P. How to Accurately Portray the Nature of Science While Teaching Science Content. National Science Teachers Association (NSTA) National Conference, St. Louis, MO, March 28-31.
68. Clough, M. P. & Berg, C. A. Critter Condos and Critical Thinking. National Science Teachers Association (NSTA) National Conference, St. Louis, MO, March 28-31.
67. Berg, C. A., Clough, M. P., Colburn, A., Penick, J. E., Russet, J., & Simpson, P. What a Secondary Science Methods Course Should Contribute to the Knowledge, Skill and Attitude of Preservice Teachers? Association for the Education of Teachers in Science (AETS) National Conference, Seattle, WA, January 11-13.
66. Clough, M. P. You Only Get What You Effectively Bargain For: A Research-Based Framework for Teaching. Association for the Education of Teachers in Science (AETS) National Conference, Seattle, WA, January 11-13.
65. Clough, M. P. Preparing Science Teachers to Develop and Implement Mentally Engaging Lab Activities. Association for the Education of Teachers in Science (AETS) National Conference, Seattle, WA, January 11-13.

1995

64. Clough, M. P. & Clough, S. J. Linking Constructivism, Active Learning, and Performance Assessment. Wisconsin Association for Supervision and Curriculum Development (WASCD) Institute, Eau Claire, WI, November 8. [Invited speakers.](#)
63. Clough, M. P. & Clough, S. J. Activate the Constructivist Learning Model in Your Science Classroom. Wisconsin Association for Supervision and Curriculum Development (WASCD) Institute, Eau Claire, WI, November 8. [Invited speakers.](#)

62. Clough, M. P. How to Accurately Portray the Nature of Science While Teaching Science Content. International History, Philosophy, and Science Teaching (IHPST) Conference, Minneapolis, MN, October 29-November 2.
61. Clough, M. P. Longitudinal Understanding of the Nature of Science as Facilitated by an Introductory High School Biology Class. International History, Philosophy, and Science Teaching (IHPST) Conference, Minneapolis, MN, October 29-November 2.
60. Clough, M. P. & Smasal, R. J. Pizza, Digestion, and Constructivism. National Association of Biology Teachers (NABT) National Conference, Phoenix, AZ, October 25-28.
59. Clough, M. P. & Berg, C. A. Critter Condos and Critical Thinking. National Association of Biology Teachers (NABT) National Conference, Phoenix, AZ, October 25-28.
58. Clough, M. P. Research Projects for ALL Biology Students. National Association of Biology Teachers (NABT) National Conference, Phoenix, AZ, October 25-28.
57. Clough, M. P. Longitudinal Understanding of the Nature of Science as Facilitated by an Introductory Biology Class. National Association of Biology Teachers (NABT) National Conference, Phoenix, AZ, October 25-28.
56. Clough, M. P. & Clough, S. J. Student-Centered Hands-on/Minds-on Environmental Education Projects. Environmental Education Roundtable at the Northwestern Wisconsin Education Association (NWEA) Conference, Eau Claire, WI, October 12. [Invited speakers.](#)
55. Clough, M. P. *et al.* Diminish Students' Resistance to Evolution Education. Wisconsin Society of Science Teachers (WSST) Conference, Middleton, WI, April 20-22.
54. Clough, M. P., Clough, S. J., & Clark, R. L. *Biology in the Community (BioCom): An Update.* Wisconsin Society of Science Teachers (WSST) Conference, Middleton, WI, April 20-22.
53. Clough, S. J., Clough, M. P., & Williams, J. L. Digestion, Pizza and Constructivism! Wisconsin Society of Science Teachers (WSST) Conference, Middleton, WI, April 20-22.
52. Clough, M. P. Strategies and Activities to Accurately Portray the Nature of Science While Teaching Science Content. Wisconsin Society of Science Teachers (WSST) Conference, Middleton, WI, April 20-22.
51. Clough, M. P. Constructivist Chemistry/Physical Science Laboratory Activity. Wisconsin Society of Science Teachers (WSST) Conference, Middleton, WI, April 20-22.
50. Clough, M. P. & Clark, R. L. Chemistry/Physical Science Constructivist Laboratory Activity. National Science Teachers Association (NSTA) National Conference, Philadelphia, PA, March 23-26.
49. Clough, S. J. & Clough, M. P. Digestion, Pizza and Constructivism! National Science Teachers Association (NSTA) National Conference, Philadelphia, PA, March 23-26.
48. Clough, M. P. *et al.* Nature of Science Symposium. Association for the Education of Teachers in Science (AETS) National Conference, Charleston, WV, January 5-8.
47. Clough, M. P. & Berg, C. A. Fostering Effective University/Cooperating Teacher/Student Teacher Experiences. Association for the Education of Teachers in Science (AETS) National Conference, Charleston, WV, January 5-8.

1994

46. Clough, M. P., Clough, S. J., Penick, J. E., Simmons, P. E. & Tweed, P. Training Science Teachers: A Response to the January 1994 *American Biology Teacher* Editorial. National Association of Biology Teachers (NABT) National Conference, St. Louis, MO, November 16-20.

45. Clough, M. P. & Clough, S. J. How to Activate the Constructivist Learning Model in Your Classroom. National Association of Biology Teachers (NABT) National Conference, St. Louis, MO, November 16-20.
44. Clough, M. P. Strategies and Activities to Accurately Portray the Nature of Science While Teaching Biology Content. National Association of Biology Teachers (NABT) National Conference, St. Louis, MO, November 16-20.
43. Clough, M. P. & Clough, S. J. What Does Constructivism Look Like in a Science Teaching Setting? National Science Teachers Association (NSTA) Regional Conference, Minneapolis, MN, November 3-5.
42. Clough, M. P., Clark, R. L., & Smasal, R. J. Fostering Effective Cooperating Teacher/Student Teacher Experiences and Career-Long Collaboration. National Science Teachers Association (NSTA) Regional Conference, Minneapolis, MN, November 3-5.
41. Clough, M. P. Nature of Science: Recommendations for Science Teacher Education Programs. North Central Association for the Education of Teachers in Science (NC-AETS) Regional Conference, Bettendorf, IA, October 6-8.
40. Clough, M. P. & Clark, R. L. A Constructivist Chemistry Lab Activity II. Wisconsin Society of Science Teachers (WSST) Conference, LaCrosse, WI, April 21-23.
39. Clough, M. P. & Clark, R. L. A Constructivist Chemistry Lab Activity I. Wisconsin Society of Science Teachers (WSST) Conference, LaCrosse, WI, April 21-23.
38. Clough, M. P. & Clough, S. J. What Does Constructivism Look Like in a Science Teaching Setting? Wisconsin Society of Science Teachers (WSST) Conference, LaCrosse, WI, April 21-23.
37. Clough, M. P., Clark, R. L. & Smasal, R. J. Fostering Effective Cooperating Teacher/Student Teacher Experiences and Career-Long Collaboration. Wisconsin Society of Science Teachers (WSST) Conference, LaCrosse, WI, April 21-23.
36. Clough, M. P. & Clark, R. L. A Constructivist Chemistry Lab Activity II. National Science Teachers Association (NSTA) National Conference, Anaheim, CA, March 30-April 2.
35. Clough, M. P. & Clark, R. L. A Constructivist Chemistry Lab Activity I. National Science Teachers Association (NSTA) National Conference, Anaheim, CA, March 30-April 2.
34. Clough, M. P. Diminish Students' Resistance to Evolution Education. National Science Teachers Association (NSTA) National Conference, Anaheim, CA, March 30-April 2.
33. Berg, C. A., Penick, J. E., Clough, M. P. & Bonnstetter, R. What Might Be Included in an Exemplary Science Methods Course? Association for the Education of Teachers in Science (AETS) National Conference, El Paso, TX, January 6-9.
32. Clough, M. Preservice Science Teacher Education and the Nature of Science: Recommendations from the Field. Association for the Education of Teachers in Science (AETS) National Conference, El Paso, TX, January 6-9.
31. Clough, M. P. Preparing Teachers to Develop Constructivist Lab Activities. Association for the Education of Teachers in Science (AETS) National Conference, El Paso, TX, January 6-9.

1993

30. Clough, M. P. & Clough, S. J. What Does Constructivism Look Like in a Science Teaching Setting? Earth Science Resource Associates Meeting, Fond du Lac, WI, October 16. [Invited speakers.](#)

29. Berg, C. A. & Clough, M. P. Science Teacher Preparation: Facilitating Paradigm Shifts. North Central Association of the Education of Teachers in Science (NC-AETS) Regional Conference, Rochester, MN, October 7-9.
28. Clough, M. P. Prepare Teachers to Develop Constructivist Lab Activities. North Central Association for the Education of Teachers in Science (NC-AETS) Regional Conference, Rochester, MN, October 7-9.
27. Clough, M. P. Preservice Science Teacher Education and the Nature of Science: Recommendations from the Field. North Central Association for the Education of Teachers in Science (NC-AETS) Regional Conference, Rochester, MN, October 7-9.
26. Clough, M. P. & Clough, S. J. Project to Incubate, Raise, and Release Quail and Ducks. Wisconsin Society of Science Teachers (WSST) Conference, Stevens Point, WI, April 23-24.
25. Clough, M. P. Use the Nature of Science to Diminish Students' Resistance to Evolutionary Theory. Wisconsin Society of Science Teachers (WSST) Conference, Stevens Point, WI, April 23-24.
24. Clough, M. P. & Smasal, R. J. The Baking Soda Decomposition Dilemma. National Science Teachers Association (NSTA) National Conference, Kansas City, MO, April 1-4.
23. Clough, M. P. & Clough, S. J. Project to Incubate, Raise, and Release Quail and Ducks. National Science Teachers Association (NSTA) National Conference, Kansas City, MO, April 1-4.
22. Clough, M. P., Berg, C. A., Clough, S. J. & Smasal, R. J. Science Teacher Education in Crisis: Thoughts from the Trenches. National Science Teachers Association (NSTA) National Conference, Kansas City, MO, April 1-4.
21. Berg, C. A. & Clough, M. P. Science Teacher Preparation: Facilitating a Paradigm Shift. National Science Teachers Association (NSTA) National Conference, Kansas City, MO, April 1-4.
20. Berg, C. A., Penick, J. E., Bonnsetter, R. & Clough, M. P. What Might Be Included in an Exemplary Science Methods Course? Association for the Education of Teachers in Science (AETS) National Conference, Charleston, SC, January 28-31.
19. Berg, C. A. & Clough, M. P. Science Teacher Preparation: Facilitating a Paradigm Shift. Association for the Education of Teachers in Science (AETS) National Conference, Charleston, SC, January 28-31.
18. Clough, M. P. Facilitating Exemplary Teaching and Professionalism: A Research-Based Rationale for Teaching Science. Association for the Education of Teachers in Science (AETS) National Conference, Charleston, SC, January 28-31.

1992

17. Clough, M. P. Use the Nature of Science to Diminish Students' Resistance to Evolution Education. National Association of Biology Teachers (NABT) National Conference, Denver, CO, November 11-15.
16. Clough, M. P. & Clough, S. J. Project to Incubate, Raise, and Release Quail and Ducks. National Association of Biology Teachers (NABT) National Conference, Denver, CO, November 11-15.
15. Clough, M. P., Berg, C. A., Clough, S. J. & Smasal, R. J. Facilitating Exemplary Teaching and Professionalism: A Research-Based Rationale for Teaching Biology. National Association of Biology Teachers (NABT) National Conference, Denver, CO, November 11-15.
14. Clough, M. P. Promoting Exemplary Teaching and Professionalism: Research-Based Rationale for Teaching. Northwestern Wisconsin Education Association (NWEA) Conference, Eau Claire, WI, October 8-9.

13. Clough, M. P. Though This Be Madness, Yet There Is No Method in It: Evidence against a universal ahistorical scientific method. Wisconsin Society of Science Teachers (WSST) Conference, Eau Claire, WI, April 3-4.
12. Clough, M. P. & Smasal, R. J. The Baking Soda Decomposition Dilemma. Wisconsin Society of Science Teachers (WSST) Conference, Eau Claire, WI, April 3-4.
11. Clough, M. P., Berg, C. A, Clough, S. J. & Smasal, R. J. Preservice Science Teacher Education in Crisis - Thoughts from the Trenches. Wisconsin Society of Science Teachers (WSST) Conference, Eau Claire, WI, April 3-4.
10. Berg, C. A. & Clough, M. P. Hunter Lesson Design: Exemplary Science Teaching or Pedagogical Cold Fusion? National Science Teachers Association (NSTA) National Conference, Boston, MA, March 26-29.
9. Clough, M. P., *et al.* Forum on Generic Lesson Design. National Science Teachers Association (NSTA) National Conference, Boston, MA, March 26-29.

1991

8. Berg, C. A. & Clough, M. P. Hunter Lesson Design: The Wrong One for Science Education. Wisconsin Society of Science Teachers (WSST) Conference, Manitowoc, WI, April 19-20.

1990

7. Berg, C. A. & Clough, M. P. Hunter Lesson Design: The Wrong One for Science Education. National Association of Biology Teachers (NABT) National Conference, Houston, TX, November 7-11.
6. Clough, M. P. Overwhelming Evidence from the Social Studies of Science Indicates that a Universal Ahistorical Scientific Method Does Not Exist. National Association of Biology Teachers (NABT) National Conference, Houston, TX, November 7-11.
5. Berg, C. A. & Clough, M. P. Hunter Lesson Design: The Wrong One for Science Education. National Science Teachers Association (NSTA) National Conference, Atlanta, GA, April 5-8.
4. Clough, M. P. Overwhelming Evidence from the Social Studies of Science Indicates that a Universal Ahistorical Scientific Method Does Not Exist. National Science Teachers Association (NSTA) National Conference, Atlanta, GA, April 5-8.
3. Clough, M. P. An Activity That Conveys a More Accurate Portrayal of the Nature of Science. National Science Teachers Association (NSTA) National Conference, Atlanta, GA, April 5-8.

1989

2. Clough, M. P. Overwhelming Evidence from the Social Studies of Science Indicates That a Universal Ahistorical Scientific Method Does Not Exist. Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 20-21.
1. Clough, M. P. An Activity That Conveys a More Accurate Portrayal of the Nature of Science. Iowa Science Teachers Section (ISTS) Conference, Des Moines, IA, October 20-21.

Workshops Conducted

42. Clough, M. P. Basic Science, Applied Science, Technology and Engineering: Complex interactions and important distinctions. Three-hour workshop for NSF Project: Improving the teaching of science, technology, engineering, and mathematics in elementary schools. Iowa State University, Ames, IA, August 3, 2016.

41. Clough, M. P. Teaching Science through Inquiry in Everyday Instruction, Part IV. Two-hour workshop for Des Moines Public School District Middle School Science Teachers. Des Moines, IA, May 4, 2016.
40. Clough, M. P. Teaching Science through Inquiry in Everyday Instruction, Part III. Two-hour workshop for Des Moines Public School District Middle School Science Teachers. Des Moines, IA, April 6, 2016.
39. Clough, M. P. Teaching Science through Inquiry in Everyday Instruction, Part II. Two-hour workshop for Des Moines Public School District Middle School Science Teachers. Des Moines, IA, February 3, 2016.
38. Clough, M. P. Teaching Science through Inquiry in Everyday Instruction, Part I. Two-hour workshop for Des Moines Public School District Middle School Science Teachers. Des Moines, IA, December 16, 2015.
37. Clough, M. P. History and nature of science in post-secondary science education: Who has time for that?! Two-hour workshop for University of Calgary science faculty. University of Calgary, Calgary, Alberta, Canada. June 24, 2015.
36. Clough, M. P., Olson, J. K., Berg, C. A., Roehrig, G. H., Tillotson, J. W. & Kruse, J. W. Developing and maintaining high quality secondary science teacher education programs: Strategies for overcoming institutional constraints. Two-hour workshop. Association for Science Teacher Education (ASTE) International Conference, San Antonio, TX, January 15-19, 2014.
35. Clough, M. P., Herman, B. C. & Olson, J. K. Knowing the NOS is One Thing, Actually Teaching it is Another: Preparing Teachers Who Actually Do Effectively Teach the NOS. Two-hour workshop. Association for Science Teacher Education (ASTE) International Conference, Minneapolis, MN, January 19-22, 2011.
34. Clough, M. P. Restructuring Science Activities. Two-hour workshop for West Des Moines School District Middle School Science Teachers, West Des Moines, IA, April 30, 2010.
33. Clough, M. P. Effectively Incorporating the Nature of Science in Post-Secondary Science Education. Full-day workshop for Edgewood College Science Faculty, Madison, WI, April, 10, 2010.
32. Olson, J. K. & Clough, M. P. Promoting and Assessing Learning in a Practice Profession. Half-day workshop for Azusa Pacific University School of Nursing faculty, Azusa, CA, March 12, 2010.
31. Olson, J. K., Clough, M. P., & Herman, B. C. Enhancing Supervision Practices in Secondary Science.” Full day workshop for university secondary science supervisors and cooperating teachers. Iowa State University, Ames, IA. February 11, 2009.
30. Olson, J. K., & Clough, M. P. Partnerships for successful science teaching. Full day workshop conducted for university secondary science supervisors and cooperating teachers. Des Moines, IA. October 16, 2008.
29. Clough, M. P. & Olson, J.K. The Nature of Science: Implications for Teaching and Learning Science. Full day workshop for University of Wisconsin-Milwaukee science teacher education program. Milwaukee, WI, July 9, 2007.
28. Clough, M. P. Science Inquiry and the Nature of Science. Half-day workshop for Area Education Agency 11 in Johnston, IA, March 1, 2007.
27. Clough, M. P. Creating and Implementing Inquiry Learning Experiences that Promote Deep Conceptual Understanding of Fundamental Science Ideas. Two-day workshop for the Community Unit School District #303, St. Charles, IL, August 3-4, 2006.
26. Berg, C. A. & Clough, M. P. The Learning Cycle: A Powerful Strategy for Promoting Learning. Two day workshop for the Moore County School District, Moore County, North Carolina, June 6-7, 2005.

25. Olson, J. K. & Clough, M. P. Learning Through Inquiry: A Powerful and Complex Strategy for Promoting Learning. One day workshop for Community Unit School District #303, St. Charles, IL, February 18, 2005.
24. Clough, M. P. The Crucial Role of Teacher Behaviors and Interaction Patterns in Implementing Inquiry Laboratory Experiences. One-day workshop for Eastern Kentucky University project funded by the National Science Foundation. Eastern Kentucky University, Richmond, KY, January 7, 2005.
23. Berg, C. A. & Clough, M. P. The Learning Cycle: A Powerful Strategy for Promoting Learning. Two day workshop for the Moore County School District, Moore County, North Carolina, June 7-8, 2004.
22. Clough, M. P. & Olson J. K. The Role of Data Collection, Self-Reflection and Peer-Coaching in Implementing Teacher Behaviors and Interaction Patterns that Promote Student Learning. One day workshop, Mayville Middle School, Mayville, WI, April 23, 2004.
21. Clough, M. P. & Olson, J. K. Effectively Teaching the Nature of Science to Secondary Students: The Role of Decontextualized and Contextualized Instruction. Half day workshop for Williamsburg School District Secondary Science Teachers, Williamsburg, IA, January 21, 2004.
20. Clough, M. P. Modifying Laboratory Activities to Promote Inquiry and Student Learning. One day workshop for Eastern Kentucky University project funded by the National Science Foundation. Eastern Kentucky University, Richmond, KY, July 24, 2003.
19. Clough, M. P. & Berg, C. A. The Role of the Teacher in Modified Cookbook Activities Designed to Mentally Engage Students. Three day workshop for the North Carolina Summer Science Leadership Institute, July 15-17, 2003.
18. Clough, M. P. & Olson, J. K. Modifying Cookbook Activities to Mentally Engage Students. One day workshop, Mayville Middle School, Mayville, WI, April 24, 2003.
17. Olson, J. K., Clough, M. P. & Madsen, A. J. "The Role of the Teacher in the Science Classroom." One day workshop with science teachers of Council Bluffs, AHST and Tri-Center School Districts. Council Bluffs, IA. November 11, 2002.
16. Clough, M. P., Olson, J. K., Madsen, A. J. & Williams, M. "Modifying Science Activities to Reflect How Students Learn." One day workshop for science teachers of Council Bluffs, AHST, Griswold, and Tri-Center School Districts. Council Bluffs, IA. September 16, 2002.
15. Clough, M. P., Olson, J. K., Williams, M. & Madsen, A. J. "Modifying Science Activities to Promote Student Goals." One day workshop conducted with science teachers of Council Bluffs, AHST, Griswold, and Tri-Center School Districts. Council Bluffs, IA. August 15, 2002.
14. Clough, M. P. and Berg, C. A. Modifying Cookbook Activities to Mentally Engage Students. Three day workshop scheduled for the North Carolina Summer Science Leadership Institute, July 16-18, 2002.
13. Clough, M. P. & Berg, C. A. Modifying Cookbook Activities to Mentally Engage Students. Three day workshop for the North Carolina Summer Science Leadership Institute, July 17-19, 2001.
12. Clough, M. P. Designing Inquiry-Based Laboratory Experiences. Half day inservice workshop for the Ames School District Science Teachers, Ames, IA, February 23, 2001.
11. Clough, M. P. Effectively Teaching the Nature of Science. Pre-conference short course. Iowa Science Teachers Section (ISTS) Conference of the Iowa Academy of Science, Des Moines, IA, October 25, 2000.
10. Clough, M. P. & Clark, R. L. Keep the Baby but Throw Away the Bath Water—Modifying Laboratory Activities to Mentally Engage Students. Half day short course, National Science Teachers Association (NSTA) Regional Conference, Milwaukee, WI, October 19-21, 2000.

9. Clough, M. P. Questioning, Wait-time, Non-verbals, Listening, and Responding: The Essential Core For Effective Teaching. Half day workshop for Pella School District Teachers, Pella, IA, February 17, 2000.
8. Clough, M. P. & Olson, J. K. Linking Constructivism, Active Learning, and Performance Assessment Half day workshop for Cedar Rapids School District Science Teachers, Cedar Rapids, IA, January 26, 2000.
7. Clough, M. P. & Olson, J. K. Modifying Lessons to Promote Inquiry and Mentally Engage Students. One day workshop for Cedar Rapids School District Science Teachers, Cedar Rapids, IA, August 10, 1999.
6. Clough, M. P. Science Activities and Teacher Behaviors Consistent with Constructivist Learning Theory and the National Science Standards. One day workshop for Plymouth School District Science Teachers, Plymouth, WI, November 3, 1997.
5. Clough, M. P. Chemistry/Physical Science Constructivist Laboratory Activities. Half day short course. National Science Teachers Association (NSTA) National Conference, New Orleans, LA, April 3-6, 1997.
4. Clough, M. P. & Clark, R. L. Chemistry/Physical Science Constructivist Laboratory Activities. Half day short course. National Science Teachers Association (NSTA) National Conference, St. Louis, MO, March 28-31, 1996.
3. Clough, M. P. What Does Teaching Consistent with Constructivist Learning Theory Look Like in an Elementary, Middle, and High School Science Setting? One day workshop for Ashwaubenon School District Science Teachers, Ashwaubenon, WI, August 8, 1995.
2. Clough, M. P. & Clark, R. L. Chemistry/Physical Science Constructivist Laboratory Activities. Half day short course. National Science Teachers Association (NSTA) National Conference, Philadelphia, PA, March 23-26, 1995.
1. Clough, M. P. University of Georgia Science/Technology/Society Education Project: Phase II. Designed and implemented six days of instruction concerning history and philosophy of science, values/ethics in science, and their classroom application. University of Georgia, Athens, GA, June 25 - July 2, 1992.

Funding Efforts

Clough, M. P., Pleasants, J., Herman, B. C., Rao, A., Miller, G., & Odeleye, O. (2022). **Novel Instructional Materials to Improve Students' Trust in STEM for Decision-Making about Socially-relevant Issues**. National Science Foundation (NSF) Department of Undergraduate Education Improving Undergraduate STEM Education (DUE:IUSE) Engaged Student Learning Level 2 Program. Proposal Number 2235704. \$599,959. Under Review.

Clough, M. P., Herman, B. C., Pleasants, J., Rao, A., Miller, G., & Odeleye, O. (2021). **Using Novel Instructional Materials to Improve Students' Trust in STEM for Decision-Making about Socially-relevant Issues**. National Science Foundation (NSF) Department of Undergraduate Education Improving Undergraduate STEM Education (DUE:IUSE) Engaged Student Learning Level 2 Program. Proposal Number 2142106. \$599,977. Panel Recommendation: Highly competitive and urged to resubmit.

Herman, B. C., Clough, M. P., Rao, A., Pellois, J. G., & Powers, T. M. (2021-24). **Using Novel Instructional Materials to Improve Students' Detection of Pseudoscience in Decision-Making about Socially-relevant Real World Issues**. National Science Foundation (NSF) Department of Undergraduate Education Improving Undergraduate STEM Education (DUE:IUSE) Engaged Student Learning Level 2 Program. Award Number 2111199. **Funded at \$599,870.**

Herman, B. C., Clough, M. P., and Rao, A. (2020). **RAPID: Supporting Responsible Action through COVID-19 Education**. National Science Foundation (NSF) Department of Undergraduate Education Improving Undergraduate STEM Education (DUE:IUSE) Engaged Student Learning: Level 1 program. Award Number 2032737. 07/01/2020 to 05/31/2021. **Funded at \$112,004.**

Clough, M. P., Herman, B. C., Kruse, J. W., Pleasants, J. B., Miller, G., Stanley, M. & Perillan, J. G. (2019). **Project Title: Humanizing STEM to Improve Learning and Restore Trust.** Proposal (Number 2013431) submitted to the National Science Foundation (NSF) Improving Undergraduate STEM Education and Human Resources (IUSE:EHR) program. \$1,509,046. Panel Recommendation: Highly Competitive. Not funded.

Olson, J. K., Clough, M. P., Fahrenwald, C., Slattery, P., & Kwok, A. (2018). Preparing and Supporting Principals for Science Education. Catapult Triand+ Seed Grant, College of Human Development, Texas A&M, College Station, TX. **Funded at \$10,000.**

Belyanin, A., Erukhimova, T., Fowler, D., Clough, M. P., & De Miranda, M. (2017). Project Title: **DEEP: Discover, Explore, and Enjoy Physics.** Proposal (Number 1803539) submitted to the National Science Foundation Improving Undergraduate STEM Education and Human Resources (IUSE:EHR) program. \$599,716. Not funded.

Clough, M. P., Kruse, J. W., Herman, B. C. & Herman, M. (2014). Project Title: **The Story Behind the Science: Bringing science and scientists to life.** Proposal (Number 1503024) submitted to the National Science Foundation Discovery Research K-12 (DR K-12) program. \$1,071,168. Not funded.

Clough, M. P., Kruse, J. W., Stanley, M. & Herman, B. C. (2014). Project Title: **The Story Behind the Science: Bringing Science and Scientists to Life.** Proposal (Number 1417738) submitted to the National Science Foundation Discovery Research K-12 (DR K-12) Program. \$1,023,316. Not funded. Panel Recommendation: Competitive.

Clough, M. P., Kruse, J. W., Stanley, M., Herman, B. C. & Rider, P. (2013). Project Title: **The Story Behind the Science: Bringing Science and Scientists to Life.** Proposal (Number 1316306) submitted to the National Science Foundation Discovery Research K-12 (DR K-12) Program. \$959,840. Not funded. Panel Recommendation: Competitive.

Clough, M. P., Kruse, J. W., Stanley, M., Herman, B. C. & Rider, P. (2012). Project Title: **The Story Behind the Science: Bringing Science and Scientists to Life.** Proposal (Number 1222167) submitted to the National Science Foundation Discovery Research K-12 (DR K-12) Program. \$828,402. Not funded. Panel Recommendation: Competitive.

Clough, M. P., Kruse, J. W., Stanley, M., Herman, B. C. & Rider, P. (2011). Project Title: **The Story Behind the Science: Bringing Science and Scientists to Life.** Proposal (Number 1118855) submitted to the National Science Foundation Discovery Research K-12 (DR K-12) Program. \$662,630. Not funded. Panel Recommendation: Competitive.

Ogilvie, C., Powell-Coffman, J., Takle, G., Greenbowe, T., Cervato, C., Colbert, J., Gentile, D., Gallus, W., Manu, A., Holmes, T, Andre, T, Clough, M. P., Saunders, K., Weaver, G. C. (2010-2013). Project Title: Engaging Young Scientists During their First Two Years at College. Howard Hughes Medical Institute Undergraduate Science Education Program. **Funded at \$1,600,000.**

Olson, J. K., Clough, M. P., Whaley, D., & Huey, G. (2008). Project Title: **Seamless Transitions into and Through Science Teacher Education.** Proposal submitted to the State of Iowa Mathematics and Science Education Partnership. **Funded at \$58,496.**

Leshem-Ackerman, A., Clough, M.P., Staker, J., Wolf, C., Ogilvie, C., Cervato, C. & Schuh, J. (2008). Project Title: **Improving Teacher Quality.** Proposal submitted to the State Grant Program and Mathematics and Science Partnership, Board of Regents Title II Fund, State of Iowa. \$392,889. Not funded.

Olson, J. K., & Clough, M. P. (2007). Project Title: **Secondary Science Education for Today's Complex Classrooms.** Proposal submitted to the Iowa State University Miller Grant program. **Funded at \$18,277.**

Clough, M. P., Olson, J. K., Stanley, M., Colbert, J. & Cervato, C. (2006-2010). **Humanizing Science to Improve Post-Secondary Science Education: Pursuing the Second Tier.** National Science Foundation Course Curriculum and Laboratory Improvement (CCLI) Phase II (Expansion) Program. Award Number 0618446. **Funded at \$293,718.**

Davis, N., Schmidt, D., Kemis, M., Allen, L.Q., Clough, M.P., Niederhauser, D., Thompson, A., Rosenbusch, M., Harms, C. & Correia, A. (2004-2008). Project Title: **Teacher Education Goes Into Virtual Schooling**. Proposal (Number 04-1568) submitted to the U.S. Department of Education Fund for the Improvement of Post Secondary Education (FIPSE) Program. **Funded at \$581,849**. October 2004 through September 2008.

Clough, M. P., Olson, J. K., Wilson, D., Colbert, J. & Cervato, C. (2004). Project Title: **Humanizing Science to Improve Post-Secondary Science Education: Pursuing the Second Tier**. Proposal (Number 0536063) submitted to the National Science Foundation Course Curriculum and Laboratory Improvement (CCLI) Program. \$200,000. Not Funded.

Clough, M. P., Olson, J. K., Wilson, D., Colbert, J. & Cervato, C. (2004). Project Title: **Humanizing Science to Improve the Teaching and Learning of Science Content**. Preproposal. Submitted to the U.S. Department of Education Fund for the Improvement of Post Secondary Education (FIPSE) Program. \$394,423. Program Terminated.

Clough, M. P., Olson, J. K., Colbert, J., Cervato, C. & Wilson D. (2004). Project Title: **Humanizing Science to Improve the Teaching and Learning of Science Content**. Preproposal (Number 0437831). Submitted to the National Science Foundation Instructional Materials Development Program. \$583,868. Not funded.

Clough, M. P., Olson, J. K., Colbert, J., Cervato, C. & Wilson D. (2004). Project Title: **Humanizing Science to Improve the Teaching and Learning of Science Content**. Iowa State University Miller Fellowship Grant. **Funded at \$24,606**.

Olson, J. K., Clough, M. P., Bonnsetter, R.J. & Berg, C. A. (2003). Project Title: **Classroom Research to Determine the Effects of Science Teacher Preparation**. United States Department of Education. \$842,059. Not Funded

Clough, M. P. & Olson, J. K. (2003). Project Title: **Modifying Science Activities for Improved Science Teaching and Learning**. Council Bluffs Community School District. Continuation of 2002 Project. **Funded at \$13,000**.

Clough, M. P. & Olson, J. K. (2003). Project Title: **Investigating the Effect of Content Relevant Historical Short Stories On Science Teachers' Nature of Science Implementation Practices and Student Achievement**. Special Research Initiation Grant (SPRIG), Iowa State University. \$14,670. Not Funded

Clough, M. P. & Olson, J. K. (2003). Project Title: **Investigating the Effect of Content Relevant Historical Short Stories on Science Teachers' Nature of Science Implementation Practices**. University Research Grants (URGS), Iowa State University. \$17,919.50. Not Funded

Clough, M. P. & Olson, J. K. (2003). Project Title: **Humanizing Science to Improve the Teaching and Learning of Science Content**. National Science Foundation. Submitted Preproposal for \$234,766 Requested to conduct pilot study and resubmit.

Clough, M. P. & Olson, J. K. (2002). Project Title: **Development of Content Relevant Historical Short Stories to Promote the Social Studies of Science in Secondary School Science**. National Endowment for the Humanities. \$250,880. Not Funded

Andre, T., Hand, B., Sharp, J., Lubienski, S., Davis, N., Olson, J., Hand, B. & Clough, M. (2002). Project Title: **Recruiting, Educating, Inducting, Supporting and Retaining Mathematics and Science Teachers To Improve the Quality of Mathematics, Science, and Technology Education for K-12 Students in the 21st Century**. *United States Department of Education*. **Funded at \$149,982**.

Clough, M. P. & Olson, J. K. (2002). Project Title: **Modifying Science Activities for Improved Science Teaching and Learning**. Council Bluffs Community School District. **Funded at \$13,000**.

Clough, M. P. & Olson, J. K. (2002). Project Title: **Investigating the Effect of Content Relevant Historical Short Stories on Science Teachers' Nature of Science Implementation Practices**. Special Research Initiation Grant (SPRIG), Iowa State University. \$15,809. Not Funded

Andre, T., Hand, B., Sharp, J., Lubienski, S., Davis, N., Olson, J. & Clough, M. (2001). Project Title: **Recruiting, Educating, Inducting, Supporting and Retaining Mathematics and Science Teachers to Improve the Quality of Mathematics, Science and Technology Education for K-12 Students in the 21st Century.** *United States Department of Education.* **Funded at \$249,398.**

Clough, M. P. & Hand, B. M. (2001). Project title: **Teachers Nurturing Teachers: Assuring Sustained Support In Science Teaching (TNT: ASSIST).** National Science Foundation Teacher Enhancement Grant Full-proposal (NSF Proposal Number 0138752). \$1,412,182. Not funded.

Clough, M. P. & Hand, B. M. (2000). Project title: **Teachers Helping Teachers: Sustained Professional Development.** National Science Foundation Teacher Enhancement Grant Full-proposal (NSF Proposal Number 0101905). \$1,319,02. Not funded.

Clough, M. P. & Hand, B. M. (2000). Project title: **Teachers Helping Teachers: Sustained Professional Development.** National Science Foundation Teacher Enhancement Grant. Pre-proposal for \$1,214,976. Encouraged to submit full proposal.

Clough, M. P. & Hand, B. M. (2000). Project title: **Improving Secondary Science Teacher Preparation Through Innovative Uses of Technology and Supervision.** Fund for the Improvement of Post Secondary Education (FIPSE). Pre-proposal for \$306,650. Not funded.

Clough, M. P., Hand, B. M. & Olson, J. K. (2000). Project Title: **Preparing Exemplary Science Teachers: The necessary role of reflection in and on practice.** Iowa State University Miller Fellowship Grant. **Funded at \$24,700.**

Clough, M. P. (1997). Project Title: **Integration of Computer Technology in The University of Iowa Science Education Program.** University of Iowa Internal Grant. **Funded at \$16,327.**

Professional Activities

Leadership Positions

- 2014-2016 At-Large member of the Association for Science Teacher Education (ASTE) National Board of Directors. Elected position.
- 2009-2015 President-Elect, International History, Philosophy and Science Teaching (IHPST) Group 2009-2011. President 2011-2013, Past President, 2013-2015. Elected position.
- 2011-2013 At-Large member of the Association for Science Teacher Education (ASTE) National Board of Directors. Elected position.
- 2004-2006 At-Large member of the Association for Science Teacher Education (ASTE) National Board of Directors for three-year term. Elected position.
- 2004-2007 President-Elect, Iowa Science Teachers Section (ISTS), Iowa Academy of Science, 2004-05. President 2005-06, Past President 2006-07. Elected position.
- 2001 Director of Northcentral Association for Science Teacher Education (NASTE) region. As the regional director, I served on the national ASTE board of directors. Elected position.

Editor, Editorial Boards and Review Panels

- 2019-2022 Editor, Springer book series, *Science: Philosophy, History and Education*. (<https://www.springer.com/series/13387>). This series is focused on the intersection of scholarship in science education and history, philosophy, and sociology of science.
- 2017 Clough, M. P. Guest Editor, Teaching and Learning about the Nature of Science. Special Virtual Issue of *Science & Education* (2020 Impact factor 2.114). <http://www.springer.com/education+%26+language/science+education/journal/11191?detailsPage=press>
- 2015-2020 Editorial Board, *Science & Education* (SCED). 2020 Impact factor 2.114. SCED is devoted to the history and nature of science in science education, which is my primary area of scholarship.
- 2014-2020 Editorial Board member, Springer book series *Contemporary Trends and Issues in Science Education* (<https://link.springer.com/bookseries/6512>). This series focuses on innovative trends and issues that are at the forefront in science education.
- 2015-2019 Associate Editor, *Journal of Research in Science Teaching* (JRST). 2020 Impact factor 4.832 and ISI Journal Citation Reports © Ranking: 2020: 21/264 (Education & Educational Research).
- 2013-2014 Member of the *Science Education* Board of Reviewers. 2020 Impact factor: 4.593 and ISI Journal Citation Reports © Ranking: 2020: 31/264 (Education & Educational Research).
- 2010-2012 Member of the *American Biology Teacher* Editorial Committee
- 2009-2012 Member of the *Science & Education* Editorial Committee.
- 2009-2014 Member of the *International Journal of Science and Mathematics Education* Review Panel.
- 2009-2012 Member of *The Science Teacher* Review Panel.
- 2008-2013 Associate Editor, *Iowa Science Teachers Journal*. Fall 2008 through Fall 2013.
- 2008 Clough, M. P. & Olson, J. K. Guest Editors, The Nature of Science: Its Teaching and Assessment Special Issue of *Science & Education* (2020 Impact factor 2.114), 17 (2-3), 143-315.
- 2006-2009 Member of *The Science Teacher* Review Panel.
- 2005-2008 Editor, *Iowa Science Teachers Journal*, Summer 2005 to Spring 2008.
- 2000-2005 Member of the *Journal of Science Teacher Education* Editorial Review Board.
- 2000-2005 Member of the *Electronic Journal of Science Education* Review Board.
- 1999-2002 Senior Reviewer for the *Journal of Research in Science Teaching*.
- 1995-2003 Member of the *Journal of Science for Persons with Disabilities* editorial review panel.
- 1991-1994 Member of *The Science Teacher* Review Panel.

I have served as a guest reviewer for *Science Education*, *Science & Education*, *Journal of Engineering Education*, and *The Science Teacher* special issue on the nature of science.

Association for Science Teacher Education (ASTE)

- 2017-2020 Conference Proposal Reviewer: History and Philosophy of Science strand.

- 2014-2016 Co-Chair, Awards Committee.
- 2011-2013 Co-Chair, Membership and Participation Committee.
- 2008-2011 Member of Publications Committee.
- 2004-2006 Co-Chair of Publications Committee.
- 2004 Member of task force that developed ASTE position statement on Science Teacher Preparation and Career-long Development, <http://www.theaste.org/>
- 2002-2004 Member of the Professional Development Committee.
- 2003 Co-Program Chair for the 2003 National Conference, St. Louis, MO.
- 2000 Member of the joint NSTA/ASTE Certification and Accreditation in Science Education (CASE) Project task group responsible for the Nature of Science standard indicators.
- 1998 Co-Program Chair for the 1998 National Conference, Minneapolis, MN.

National Association of Research in Science Teaching (NARST)

- 2016-2019 Conference Proposal Reviewer: Strand 13: History, Philosophy, and Sociology of Science.
- 2001-2002 Conference Proposal Reviewer: Strand 1 - Learning: Students' Conceptions and Conceptual Change.
- 1999-2004 Conference Proposal Reviewer: Strand 8 - History, Philosophy, and Epistemology.
- 1998 Conference co-coordinator: Strand 8 - History, Philosophy, and Epistemology.

National Science Teachers Association (NSTA)

- 2010 Member of NSTA task for to create a new position statement on Research in Science Education. Position Statement adopted by the NSTA Board of Directors, September 2010. <http://www.nsta.org/about/positions/research.aspx>
- 2004 Member of NSTA task for to create a new position statement on Inquiry. Position Statement adopted by the NSTA Board of Directors, October 2004. <http://www.nsta.org/about/positions/inquiry.aspx>
- 2004 Member of NSTA task for to create a new position statement on Science Teacher Preparation. Position Statement adopted by the NSTA Board of Directors, July 2004. <http://www.nsta.org/about/positions/preparation.aspx>
- 2003-2006 Member of the NSTA Committee on Preservice Teacher Preparation. June 1, 2003 to May 30, 2006.
- 2000 Member of NSTA task force to develop position statement regarding the nature of science. Position Statement adopted by the NSTA Board of Directors, July 2000. <http://www.nsta.org/about/positions/natureofscience.aspx>

Other Professional Organizations

- 2012-2017 Iowa Academy Science (IAS) Exemplary Science Teaching Award (ESTA) Committee.

1995-1997 Member of National Association of Biology Teachers (NABT) *Monograph Subcommittee* from March 1995 to March 1997. This subcommittee reviewed monographs and provided advice to the *Publications Committee*.

Other Activities

- 2021 Chair, TLAC Post-Tenure Review Committee, Texas A&M University
- 2018-2020 Lead role in conceptualizing and seeing through the approval process a Post-Secondary Science Teaching Certificate. Approved 2021. Texas A&M University
- 2018-2019 Tenure-Line Evaluation Committee. Texas A&M. TLAC. February 2018 through August 2019.
- 2016-2017 Student Grievance Committee. Iowa State University. Fall 2016 though Spring 2017.
- 2013-2019. Faculty Review Board. Iowa State University. Fall 2013 through Spring 2019.
- 2013-2017 Educator Preparation Coordinating Council (EPCC) Member, Spring 2013 through Spring 2017.
- 2009-2012 ISU Faculty Senate Representative from Fall 2009 through Spring 2012.
- 2009-2012 Member of Faculty Senate Academic Affairs Council from Fall 2009 through Spring 2012.
- 2006-2009 ISU Faculty Senate Representative from Fall 2006 through Spring 2009.
- 2006-2009 Member of Faculty Senate Academic Affairs Council from Fall 2006 through Spring 2009.
- 2003-2016 ISU National Science Teachers Association (NSTA) Student Chapter Faculty Advisor.
- 2003-2007 Biology Education Teaching And Learning (BETAL) Community. Faculty: Jim Colbert, Michael Clough, Joanne Olson and Michael Zeller.
- 2001-2004 State Science and Technology Fair of Iowa, Fair judge. Advisor to Board of Directors Fall 2003.
- 2001-2003 Program Development: Clough, M. P., Olson, J. K. and Hand, B. M. Created a Master of Arts in Teaching (M.A.T.) degree for prospective teachers possessing a bachelor's degree in a science field. Successfully steered the program through the University approval process. Approved by the Iowa Board of Regents in July 2003.
- 1999-2004 Curriculum & Instruction Undergraduate Studies (UGS) committee.
- 2000-2001 Off-site Evaluator for a Grant at the University of Wisconsin-Milwaukee Titled "Developing Middle and High School Technology Enriched Lessons to Accommodate Students With Disabilities." Co-Principal Investigators: Lisa Dieker and Craig Berg, June 2000 to June 2001.
- 1999-2001 Program Development: Clough, M. P., Hand, B. M., Dolphin, W., Colbert, J., and Drewes, C. Restructured the ISU undergraduate secondary science teacher education program so that it includes a nature of science course, three university science methods courses each with extensive field experiences, and student teaching.
- 1998-1999 Coordinator of the University of Iowa M.A.T. science teacher education program.
- 1994 Writer, Reviewer, and Field Test Teacher for *Biology: A Community Context*. Invited contributor to Unit One, *Matter and Energy for Life* February 1994), and Unit 8, *The Biosphere* (July 1994). Field tested unit 1 during the 1993-94, 94-95, and 95-96 school years. Assisted in writing the *Instructional Resource* and *Teacher Guide*.

- 2017- Texas A&M University Advising
Completed Degrees: Ph.D (1 Member); M.S. (1 Co-chair); M.Ed. (1 Chair; 1 Member).
Degrees in Progress: Ph.D. (3 Chair, 4 Member).
- 1999-2017 Iowa State University Graduate Advising
Completed Degrees: Ph. D. (2 Chair, 9 Co-Chair, 7 Member, 2 Outside Member), M.S. (5 Chair, 1 Co-Chair, 4 Member, 4 Outside Member), M.Ed. (4 Chair, 1 Co-Chair, 5 Member), and M.A.T. (137 Co-Chair).
- 1996-1999 University of Iowa Graduate Advising
Completed Degrees: Ph.D.(3 Comm. Member) and M.A.T. (12 Chair).