Selected Readings for Physics Education Researchers within and beyond PER

By Kathy Perkins and Sam McKagan

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History: At the first FFPER meeting in 2005, a working group chaired by John Thompson and Brad Ambrose assembled to compile "a list of publications describing research on the teaching and learning of physics that are considered primary and necessary by everyone in the field." (http://www.per-central.org/ffper/working-groups/2005/PER-Canon). A primary list of 25 publications was identified as essential readings for physics education researchers, along with a secondary list of about 50 publications also identified as essential but either not the first of their kind or outside of PER.

A new goal: Physics education research (PER) has seen tremendous growth in the number of researchers, in the span of research questions, and in the types of research methodologies used. In many cases, research directions – both new and longstanding – are grounded in or inspired by work in fields outside of PER, such as education research, cognitive science, learning sciences, educational psychology, behavioral science, other discipline-based education research fields, etc. In addition, PER community members often wear many hats – researcher, professional development provider for TAs or faculty, curriculum developer, or departmental /institutional resource for questions on teaching, learning, and course reform. With this context in mind, the goal of this working group was to create a compilation of publications within and beyond the PER literature to broadly serve the community. This resource was envisioned as comprehensive enough to include all areas of PER, theories that underlie our work, methodologies used in PER research, and other specific research areas that have influenced our field and its work. The resource is not meant to include all papers on a particular topic (e.g. constructivism, metacognition, interactive engagement, teacher preparation, qualitative methods), but to provide one to three papers as a good foundational starting point for learning about that topic or sub-topic.

The Audience: Our group settled on creating a resource that best serves us: practicing physics education researchers. Other groups that might benefit from this resource include graduate students beginning a Ph.D. in PER; faculty and students of a "Teaching and Learning Physics" course; and college faculty or high school teachers interested in physics course reform. To make this resource most useful, we sought a dissemination mechanism that enabled a flexible "tagging", allowing identification of publications within the broader list that are well-suited to different audiences.

The Selection Process: Working before the FFPER conference itself, we identified 5 main categories, with an initial list of topics under each category:

1. Theories (e.g., constructivism, socio-cultural perspectives, situated cognition, conceptual change)
2. Studies related to students and learning, both general (e.g., analogies, problem solving, epistemology, cognitive load) and content specific (e.g., student difficulties at various levels)

3. Pedagogical Approaches and Implementation Strategies (e.g., tutorials, classroom response systems, simulations, group work)
4. Teacher Training and Faculty Change (e.g., teacher content knowledge, faculty change, nature of science)
5. Research Tools and Methodologies (e.g., qualitative and quantitative methods, assessment development, statistics)

At the conference, the working group divided itself into 5 subgroups corresponding to these categories identified and discussed possible papers for inclusion. Selected papers generally met one or more of the following criteria:

- Foothold papers – introduce diverse, but relevant, ideas upon which PER builds.
- Generative papers – drive forward future research.
- Exemplary papers –provide good examples of a particular kind of research, methodology, or pedagogy
- Literacy in PER – help readers to understand and converse in PER
- Historical value – offer historical perspective in PER

Dissemination and Growth: In order to make the selected articles easily accessible, capable of being tagged and commented upon, and dynamic (e.g., new articles could be added in the future), the working group decided to disseminate the list on comPADRE and as PERticles. PERticles is a collection of PER articles hosted on CiteULike; within this collection, publications have been added and tagged with "SelectedReadings_2011" and with any additional tags identified by the working group during the selection process. (The tags "Canon_2005" and "Canon_2005_ BList" identify the canon developed by the FFPER working group in 2005.) comPADRE will also host the final document of selected 2011 publications, organized by category and sub-topics (http://www.per-central.org/ffper/working-groups/2011/selected-readings/).

The field is continuing to grow and evolve, developing new pedagogies, applying new methodologies, and drawing ideas from diverse fields. We encourage the community to participate in further development of this resource by adding papers to PERticles and tagging them with “SelectedReadings_Candidate”. With this practice, the compilation of papers can benefit from and reflect the expertise and work of the entire PER community. We thank you in advance for your efforts! (Note: The working group so enjoyed reading individuals’ personal suggested reading lists that we also suggest adding a collection of articles to PERticles tagged with your name.)

Acknowledgements: We would like to thank all the members of our working group, along with everyone who gave us their suggested readings ahead of the conference: Ayush Gupta, Joe Redish, the CU and UBC Science Education Initiatives, and the CU PER Group, especially Stephanie Chasteen, Noah Podolefsky, Kara Gray, Mike Ross, and Ben VanDusen.

Selected Readings for Physics Education Researchers within and beyond PER

Table of Contents:

I. Theories

[(tag: theories) 61 articles]

General Resources

1. The Cambridge Handbook of the Learning Sciences (Cambridge Handbooks in Psychology) (24 April 2006)

Constructivism

2. Theories-in-Action: Some Theoretical and Empirical Issues in the Study of Students' Conceptual Frameworks in Science Studies in Science Education, Vol. 10, No. 1. (1 January 1983), pp. 37-60. by Rosalind Driver, Gaalen Erickson
3. Epistemological Anarchy and the Many Forms of Constructivism Science & Education, Vol. 6, No. 1. (1 January 1997), pp. 15-28. by David R. Geelan
4. From Jean Piaget to Ernst von Glasersfeld: An Epistemological Itinerary in Review. Constructivist Foundations, Vol. 6, No. 2. (2011), pp. 152-156. by J. L. Le Moigne
5. Piaget's theory In PH Mussen In Carmichael's manual of child psychology (1970), pp. 703-732. by J. Piaget edited by Leonard Carmichael, Paul H. Mussen

Socio-cultural perspectives

6. Cultural Reproduction and Social Reproduction In Knowledge, Education, and Cultural Change (1973) by P. Bourdieu edited by R. Brown
7. Distributed Cognitions: Psychological and Educational Considerations (Learning in Doing: Social, Cognitive and Computational Perspectives)(27 August 1993)
8. Sociocultural approaches to learning and development: A Vygotskian framework Educational Psychologist, Vol. 31, No. 3. (1996), pp. 191-206. by Vera John-Steiner, Holbrook Mahn
9. Articulating communities: Sociocultural perspectives on science education Journal of Research in Science Teaching, Vol. 38, No. 3. (March 2001), pp. 296-316. by J. L. Lemke
10. Constructing Scientific Knowledge in the Classroom EDUCATIONAL RESEARCHER, Vol. 23, No. 7. (1 October 1994), pp. 5-12. by Rosalind Driver, Hilary Asoko, John Leach, Philip Scott, Eduardo Mortimer
11. Guiding Principles for Fostering Productive Disciplinary Engagement: Explaining an Emergent Argument in a Community of Learners Classroom. Cognition and Instruction, Vol. 20, No. 4. (2002), pp. 399-483. by Randi A. Engle, Faith R. Conant
12. Learning and discourse: A sociocultural perspective In Learning with Computers: Analysing Productive Interactions (07 January 1999) by R. Säljö

13. Communities of practice : learning, meaning, and identity. (01 December 2002) by Etienne Wenger
14. Mind in society : the development of higher psychological processes (1978) by L. S. Vygotskii, Michael Cole

Situated Cognition

15. Representation as Shared Activity: Situated Cognition and Dewey's Cartography of Experience by Rogers Hall
16. Situated Cognition and the Culture of Learning Educational Researcher, Vol. 18, No. 1. (January 1989), pp. 32-42. by John S. Brown, Allan Collins, Paul Duguid
17. Cognition in practice : mind, mathematics, and culture in everyday life (29 July 1988) by Jean Lave

Distributed cognition

18. How a Cockpit Remembers Its Speed Cognitive Science, Vol. 19 (1995), pp. 265-288. by E. Hutchins
19. Cognition in the wild (10 February 1995) by Edwin Hutchins

Conceptual Change: Misconceptions, Resources, etc.

20. A history of conceptual change research: Threads and fault lines. In The Cambridge Handbook of the Learning Sciences (2006), pp. 265-282. by A. DiSessa edited by K. Sawyer
21. What changes in conceptual change? International Journal of Science Education, Vol. 20, No. 10. (1 December 1998), pp. 1155-1191. by Andrea A. diSessa, Bruce L. Sherin
22. A challenge to conceptual change Science Education, Vol. 77, No. 3. (June 1993), pp. 293-300. by Cedric J. Linder
23. Resources, framing, and transfer In Transfer Of Learning: Research And Perspectives (2005), pp. 89-120. by D. Hammer, A. Elby, R. E. Scherr, E. F. Redish edited by J. Mestre
24. Cognitive science and science education. American Psychologist, Vol. 41, No. 10. (1986), pp. 1123-1130. by Susan Carey
25. Accommodation of a scientific conception: Toward a theory of conceptual change Science Education, Vol. 66, No. 2. (April 1982), pp. 211-227. by George J. Posner, Kenneth A. Strike, Peter W. Hewson, William A. Gertzog
26. A revisionist theory of conceptual change In Philosophy of science, cognitive psychology, and educational theory and practice (1992), pp. 147-176. by K. A. Strike, G. J. Posner edited by Richard A. Duschl, Richard J. Hamilton

Linguistics, Metaphor, and Blending Thought

27. The Cambridge handbook of metaphor and thought (2008) by Raymond W. Gibbs
28. Metaphors We Live By (15 April 2003) by George Lakoff, Mark Johnson
29. Where Mathematics Comes From: How the Embodied Mind Brings Mathematics into Being (02 August 2001) by George Lakoff, Rafael Nuñez

Embodied Cognition

30. Six views of embodied cognition Psychonomic Bulletin & Review, Vol. 9, No. 4. (1 December 2002), pp. 625-636. by Margaret Wilson
31. Grounded Cognition Annual Review of Psychology, Vol. 59, No. 1. (15 August 2008), pp. 617-645. by Lawrence W. Barsalou

Dewey

32. How we think (10 July 1997) by John Dewey

Personal Epistemology

33. Coherence vs. Fragmentation in student epistemologies: A reply to Smith & Wenk Electronic Journal of Science Education, Vol. 14, No. 1. (2010) by A. Elby
34. The Development of Epistemological Theories: Beliefs About Knowledge and Knowing and Their Relation to Learning Review of Educational Research, Vol. 67, No. 1., pp. 88-140. by Barbara K. Hofer, Paul R. Pintrich

Ontological categories

35. From things to processes: A theory of conceptual change for learning science concepts Learning and Instruction, Vol. 4, No. 1. (1994), pp. 27-43. by M. Chi
36. The Case for Dynamic Models of Learners' Ontologies in Physics Journal of the Learning Sciences, Vol. 19, No. 3. (2010), pp. 285-321. by Ayush Gupta, David Hammer, Edward F. Redish

Cognitive Processes and Developmental Constraints

37. The magical number seven, plus or minus two: some limits on our capacity for processing information. Psychological Review, Vol. 63, No. 2. (1956), pp. 81-97. by George A. Miller
38. The representation of knowledge in memory (Center for Human Information Processing, Dept. of Psychology, University of California, San Diego ; technical report) by David E. Rumelhart
39. Supporting valid interpretations of learning progression level diagnoses Journal of Research in Science Teaching, Vol. 46, No. 6. (August 2009), pp. 699-715. by Jeffrey T. Steedle, Richard J. Shavelson
40. Reassessment of Developmental Constraints on Children's Science Instruction Review of Educational Research, Vol. 65, No. 2., pp. 93-127. by Kathleen E. Metz

Expert Reasoning in Science

41. How Scientists Think in the Real World Implications for Science Education Journal of Applied Developmental Psychology, Vol. 21, No. 1. (February 2000), pp. 49-58. by K. Dunbar
42. Surpassing Ourselves: An Inquiry Into the Nature and Implications of Expertise (19 October 1993) by Carl Bereiter, Marlene Scardamalia
43. Epistemic Cultures: How the Sciences Make Knowledge (01 May 1999) by Karin K. Cetina
44. The Structure of Scientific Revolutions (15 December 1996) by Thomas S. Kuhn
45. Science in Action: How to Follow Scientists and Engineers Through Society (15 October 1988) by Bruno Latour
46. The reflective practitioner: how professionals think in action (23 September 1983) by Donald A. Schön
47. An Introduction to Science and Technology Studies (20 October 2009) by Sergio Sismondo

Transfer

48. Rethinking Transfer: A Simple Proposal with Multiple Implications Review of Research in Education, Vol. 24 (1999) by John D. Bransford, Daniel L. Schwartz

"Beyond cold change"

49. Self-efficacy: toward a unifying theory of behavioral change. Psychological review, Vol. 84, No. 2. (March 1977), pp. 191-215. by A. Bandura

50. Beyond Cold Conceptual Change: The Role of Motivational Beliefs and Classroom Contextual Factors in the Process of Conceptual Change. Review of Educational Research, Vol. 63, No. 2. (1993), pp. 167-99. by Paul R. Pintrich, And Others
51. On Becoming A Person (01 January 1976)
52. The Emotional Experience of Learning and Teaching (27 October 1983) by Gianna Henry, Elsie Osborne, Isca Salzberger-Wittenberg

Identity

53. Identity as an Analytic Lens for Research in Education Review of Research in Education, Vol. 25 (2000), pp. 99-125. by James P. Gee
54. A threat in the air. How stereotypes shape intellectual identity and performance. The American psychologist, Vol. 52, No. 6. (June 1997), pp. 613-629. by C. M. Steele

Science Studies / Sociology of Science

55. Science in Action: How to Follow Scientists and Engineers Through Society (15 October 1988) by Bruno Latour
56. Drawing things together In Representation in Scientific Practice (02 October 1990), pp. 19-68. by B. Latour edited by M. Lynch, S. Woolgar
57. Lists, field guides, and the descriptive organization of seeing: Birdwatching as an exemplary observational activity Human Studies, Vol. 11, No. 2. (April 1988), pp. 271-303. by John Law, Michael Lynch

Miscellaneous

58. Cognition and learning In Handbook of Educational Psychology (Macmillan research on education handbook series) (1996), pp. 15-46. by J. G. Greeno, A. M. Collins, L. B. Resnick
59. Reflection and phenomenography: towards theoretical and educational development possibilities Learning and Instruction, Vol. 13, No. 3. (June 2003), pp. 271-284. by C. Linder
60. Personal Knowledge Reissue (26 March 1998) by Michael Polanyi
61. Reframing: The role of experience in developing teachers' professional knowledge In The Reflective turn : case studies in and on educational practice (1991), pp. 164-187. by T. Russell, H. Munby, Others edited by Donald A. Schön
62. Generative metaphor: A perspective on problem-setting in social policy In Metaphor and Thought (November 1993), pp. 137-163. by Donald A. Schön edited by Andrew Ortony

II. Studies related to students and learning

[(tag: Students_and_learning) 81 articles]

Teaching and learning Physics/Science out School

63. Development of Knowledge about Electricity and Magnetism during a Visit to a Science Museum and Related Post-Visit Activities. *Science Education*, Vol. 84, No. 4. (2000), pp. 658-79. by David Anderson, Keith B. Lucas, Ian S. Ginns, Lynn D. Dierking
64. Learning from Museums: Visitor Experiences and the Making of Meaning (American Association for State and Local History) (17 May 2000) by John H. Falk, Lynn D. Dierking
65. Bridging the Gap between Formal and Informal Science Learning. *Studies in Science Education*, Vol. 28 (1996), pp. 87-112. by Avi Hofstein, Sherman Rosenfeld

66. T. Kuhn Meets T. Rex: Critical Conversations and New Directions in Science Centres and Science Museums. *Studies in Science Education*, Vol. 37 (2002), pp. 1-41. by Erminia Pedretti
67. Students Understanding of the Special Theory of Relativity and Design for a Guided Visit to a Science Museum *International Journal of Science Education*, Vol. 31, No. 15. (2009), pp. 2085-2104. by Jenaro Guisasola, Jordi Solbes, José-Ignacio Barragues, Maite Morentin, Antonio Moreno

Student Understanding (upper and lower division, and non-majors)

68. University students' conceptions of the electric and magnetic fields and their interrelationships *European Journal of Physics*, Vol. 32, No. 2. (01 March 2011), 521. by M. H. P. Kesonen, M. A. Asikainen, P. E. Hirvonen
69. Mental models (01 May 1983) by Dedre Gentner, Albert L. Stevens
70. Naive Theories of Motion. In Mental models (1982), pp. 299-324. by Michael McCloskey edited by D. Gentner, A. L. Stevens
71. Bibliography, students' alternative frameworks and science education by Helga Pfundt
72. Cognitive science and science education. *American Psychologist*, Vol. 41, No. 10. (1986), pp. 1123-1130.by Susan Carey
73. More than misconceptions: Multiple perspectives on student knowledge and reasoning, and an appropriate role for education research *American Journal of Physics*, Vol. 64, No. 10. (1996), 1316. by David Hammer
74. Investigation of Student Understanding of the Concept of Velocity in One Dimension. *American Journal of Physics*, Vol. 48, No. 12. (December 1980), pp. 1020-28. by David E. Trowbridge, Lillian C. McDermott
75. Student understanding of the work-energy and impulse-momentum theorems *American Journal of Physics*, Vol. 55, No. 9. (1987), pp. 811-817. by Ronald A. Lawson
76. First-year physics students' perceptions of the quality of experimental measurements *International Journal of Science Education*, Vol. 20, No. 4. (April 1998), pp. 447-459. by Saalih Allie, Andy Buffler, Bob Campbell, Fred Lubben
77. Oersted Medal Lecture 2001: "Physics Education Research—The Key to Student Learning" *American Journal of Physics*, Vol. 69, No. 11. (2001), pp. 1127-1137. by Lillian C. McDermott
78. Investigating student understanding in intermediate mechanics: Identifying the need for a tutorial approach to instruction *American Journal of Physics*, Vol. 72 (2004), pp. 453-459. by Bradley S. Ambrose
79. Investigating Student Understanding of Quantum Physics: Spontaneous Models of Conductivity. *American Journal of Physics*, Vol. 70, No. 3. (2002), pp. 218-26. by Michael C. Wittmann, Richard N. Steinberg, Edward F. Redish
80. Empirical Investigations of Learning and Teaching, Part I: Examining and Interpreting Student Thinking In Proceedings of the International School of Physics {Enrico Fermi,} Course CLVI: Research on Physics Education (2003), pp. 341-350. by Paula R. L. Heron edited by Edward F. Redish, Matilde Vicentini
81. The Object Coordination Class Applied to Wavepulses: Analysing Student Reasoning in Wave Physics (10 Jul 2002) by Michael C. Wittmann
82. Research as a guide for improving student learning: An example from momentum conservation *American Journal of Physics*, Vol. 78, No. 9. (2010), pp. 961-969. by Hunter G. Close, Paula R. L. Heron

Assessments

83. Making classroom assessment more accountable to scientific reasoning: A case for attending to mechanistic thinking *Science Education*, Vol. 93, No. 5. (1 September 2009), pp. 875-891. by Rosemary S. Russ, Janet E. Coffey, David Hammer, Paul Hutchison
84. The Development and Validation of a Classroom Test of Formal Reasoning *Journal of Research in Science Teaching* (1978) by Anton E. Lawson
85. Assessing student learning of Newton's laws: The Force and Motion Conceptual Evaluation and the Evaluation of Active Learning Laboratory and Lecture Curricula *American Journal of Physics*, Vol. 66, No. 4. (1998), pp. 338-352. by Ronald K. Thornton

Analogies

86. Using bridging analogies and anchoring intuitions to deal with students' preconceptions in physics *J. Res. Sci. Teach.*, Vol. 30, No. 10. (1993), pp. 1241-1257.by John Clement
87. The in vivo/in vitro approach to cognition: the case of analogy. *Trends in cognitive sciences*, Vol. 5, No. 8. (1 August 2001), pp. 334-339. by K. Dunbar, I. Blanchette
88. Metaphors We Live By (15 April 2003) by George Lakoff, Mark Johnson
89. Structure-mapping: A theoretical framework for analogy *Cognitive Science*, Vol. 7, No. 2. (1983), pp. 155-170. by Dedre Gentner

Representations

90. Inventing Graphing: Meta-Representational Expertise in Children. *Journal of Mathematical Behavior*, Vol. 10, No. 2. (1991), pp. 117-60. by Andra A. DiSessa, And Others
91. Representation as Shared Activity: Situated Cognition and Dewey's Cartography of Experience by Rogers Hall

Problem Solving

92. Understanding and teaching important scientific thought processes *Journal of Science Education and Technology*, Vol. 4, No. 4. (10 December 1995), pp. 261-282. by Frederick Reif
93. Mathematical Problem Solving by Alan Schoenfeld
94. Teaching problem solving through cooperative grouping. Part 1: Group versus individual problem solving *American Journal of Physics*, Vol. 60, No. 7. (1992), pp. 627-636. by Patricia Heller
95. Teaching problem solving through cooperative grouping. Part 2: Designing problems and structuring groups *American Journal of Physics*, Vol. 60, No. 7. (1992), 637. by Patricia Heller

Expert-Novice Difference

96. Categorization and representation of physics problems by experts and novices *Cognitive Science*, Vol. 5, No. 2. (1981), pp. 121-152. by Michelene T. Chi, Paul J. Feltovich, Robert Glaser
97. From things to processes: A theory of conceptual change for learning science concepts *Learning and Instruction*, Vol. 4, No. 1. (1994), pp. 27-43. by M. Chi
98. Expert and Novice Performance in Solving Physics Problems *Science*, Vol. 208, No. 4450. (20 June 1980), pp. 1335-1342. by Jill Larkin, John McDermott, Dorothea P. Simon, Herbert A. Simon

Attitudes/Beliefs/Perceptions/Expectations

99. Sociomathematical Norms, Argumentation, and Autonomy in Mathematics. *Journal for Research in Mathematics Education*, Vol. 27, No. 4. (1996), pp. 458-77. by Erna Yackel, Paul Cobb
100. Student expectations in introductory physics *American Journal of Physics*, Vol. 66, No. 3. (1998), pp. 212-224. by Edward F. Redish, J. M. Saul, R. N. Steinberg
101. Reinventing college physics for biologists: Explicating an epistemological curriculum *American Journal of Physics*, Vol. 77, No. 7. (1 July 2009), pp. 629-642. by Edward F. Redish, David Hammer

Epistemology

102. Personal epistemology: The psychology of beliefs about knowledge and knowing (2002) by Barbara K. Hofer, Paul R. Pintrich
103. Epistemological Beliefs in Introductory Physics *Cognition and Instruction*, Vol. 12, No. 2. (1994)
104. Epistemic Forms and Epistemic Games: Structures and Strategies to Guide Inquiry *Educational Psychologist*, Vol. 28, No. 1. (1993), pp. 25-42. by Allan Collins, William Ferguson
105. Individual and Sociocultural Views of Learning in Science Education. *Science and Education*, Vol. 12, No. 1. (2003), pp. 91-113. by John Leach, Phil Scott

Identity

106. Identity as an Analytic Lens for Research in Education *Review of Research in Education*, Vol. 25 (2000), pp. 99-125. by James P. Gee

Nature of Science, including Argumentation

107. Children and adults as intuitive scientists. *Psychological review*, Vol. 96, No. 4. (October 1989), pp. 674-689.by D. Kuhn
108. Students' and Teachers' Conceptions of the Nature of Science: A Review of the Research. *Journal of Research in Science Teaching*, Vol. 29, No. 4. (1992), pp. 331-59. by Norman G. Lederman

Metacognition

109. What's the fuss about metacognition? In Cognitive science and mathematics education (1987), pp. 189-215. by Alan H. Schoenfeld

Expertise/Deliberate Practice

110. The influence of experience and deliberate practice on the development of superior expert performance In The Cambridge Handbook of Expertise and Expert Performance (Cambridge Handbooks in Psychology) (26 June 2006) by K. Anders Ericsson
111. Talking Mathematics in School: Studies of Teaching and Learning (Learning in Doing: Social, Cognitive and Computational Perspectives) (03 March 2011), pp. 107-149. by R. Stevens, R. Hall
112. Disciplined perception: Learning to see in technoscience *Talking mathematics in school: Studies of teaching and learning* (1998), pp. 107-149. by R. Stevens, R. Hall
113. How Scientists Think in the Real World Implications for Science Education *Journal of Applied Developmental Psychology*, Vol. 21, No. 1. (February 2000), pp. 49-58.by K. Dunbar
114. The Expert Mind *Scientific American*, Vol. 295, No. 2. (August 2006), pp. 64-71. by Philip E. Ross

Memory/Cognitive Load

115. The magical number seven, plus or minus two: some limits on our capacity for processing information. *Psychological Review*, Vol. 63, No. 2. (1956), pp. 81-97. by George A. Miller

Retention of Knowledge

116. Test-Enhanced Learning; Taking Memory Tests Improves Long-Term Retention *Psychological Science*, Vol. 17, No. 3. (01 March 2006), pp. 249-255. by Henry L. Roediger, Jeffrey D. Karpicke
117. Do they stay fixed? *The Physics Teacher*, Vol. 36, No. 8. (1998), 488. by Gregory E. Francis
118. Longitudinal study of student conceptual understanding in electricity and magnetism *Phys. Rev. ST Phys. Educ. Res.*, Vol. 5, No. 2. (Dec 2009), 020110. by S. J. Pollock

Transfer of Knowledge including Preparation for Future Learning (PFL)

119. Transfer Of Learning: Research And Perspectives (Current Perspectives on Cognition, Learning, and Instruction) (15 July 2005) by Jose P. Mestre Editor
120. Framing Interactions to Foster Generative Learning: A Situative Explanation of Transfer in a Community of Learners Classroom *Journal of the Learning Sciences*, Vol. 15, No. 4. (2006), pp. 451-498. by Randi A. Engle
121. Preschool children can learn to transfer: learning to learn and learning from example. *Cognitive psychology*, Vol. 20, No. 4. (October 1988), pp. 493-523. by A. L. Brown, M. J. Kane
122. Inventing to Prepare for Future Learning: The Hidden Efficiency of Encouraging Original Student Production in Statistics Instruction *Cognition and Instruction*, Vol. 22, No. 2. (1 June 2004), pp. 129-184. by Daniel L. Schwartz, Taylor Martin

Diversity / Equity / Access, including Gender, Under-represented populations, Stereotype Threat

123. A threat in the air. How stereotypes shape intellectual identity and performance. *The American psychologist*, Vol. 52, No. 6. (June 1997), pp. 613-629. by C. M. Steele
124. Stereotype threat and inflexible perseverance in problem solving *Journal of Experimental Social Psychology*, Vol. 45, No. 4. (July 2009), pp. 853-859. by Priyanka B. Carr, Claude M. Steele
125. Differences in Male/Female Response Patterns on Alternative-format Versions of the Force Concept Inventory In Physics Education Research Conference (25-26 July 2001), pp. 103-106. by Laura McCullough, David E. Meltzer edited by S. Franklin, J. Marx, K. Cummings
126. Gender, Context, and Assessment *Journal of International Women's Studies*, Vol. 5, No. 4. (2004) by L. McCullough
127. Appropriating Scientific Discourse: Findings From Language Minority Classrooms. Research Report: 3. [Revised.] (1992) by Ann S. Rosebery, And Others
128. Adam, Adam, Adam, and Adam: The cultural construction of a learning disability In Successful Failure: The School America Builds (05 February 1999), pp. 25-44. by R. McDermott, H. Varenne, A. L. Becker edited by Herne Varenne, Ray Mcdermott
129. The acquisition of a child by a learning disability In Understanding Practice, pp. 269-305. by R. P. McDermott edited by Seth Chaiklin, Jean Lave
130. Gender disparities in second-semester college physics: The incremental effects of a "smog of bias" *Phys. Rev. ST Phys. Educ. Res.*, Vol. 6, No. 2. (September 2010) by Lauren E. Kost-Smith, Steven J. Pollock, Noah D. Finkelstein

Motivation and interest

131. Beyond Cold Conceptual Change: The Role of Motivational Beliefs and Classroom Contextual Factors in the Process of Conceptual Change. *Review of Educational Research*, Vol. 63, No. 2. (1993), pp. 167-99. by Paul R. Pintrich, And Others
132. A Social-Cognitive Approach to Motivation and Personality. *Psychological Review*, Vol. 95, No. 2. (1988), pp. 256-73. by Carol S. Dweck, Ellen L. Leggett
133. The Four-Phase Model of Interest Development *Educational Psychologist*, Vol. 41, No. 2. (2006), pp. 111-127. by Suzanne Hidi, K. Ann Renninger

Learning Styles (Critique of)

134. Learning Styles *Psychological Science in the Public Interest*, Vol. 9, No. 3. (1 December 2008), pp. 105-119. by Harold Pashler, Mark McDaniel, Doug Rohrer, Robert Bjork
135. Learning Styles: A Critique *Management Learning*, Vol. 28, No. 2. (1 June 1997), pp. 115-133. by Michael Reynolds

Math in physics

136. How Students Understand Physics Equations. *Cognition and Instruction*, Vol. 19, No. 4. (2001), pp. 479-541. by Bruce L. Sherin
137. Analyzing Problem Solving Using Math in Physics: Epistemological Framing via Warrants *ArXiv e-prints* (31 July 2009) by T. J. Bing, E. F. Redish
138. Translation Difficulties in Learning Mathematics. *American Mathematical Monthly*, Vol. 88, No. 4. (April 1981), pp. 286-90. by John Clement, And Others

Technology and Learning

139. Increased interestingness of extraneous details in a multimedia science presentation leads to decreased learning. *Journal of experimental psychology. Applied*, Vol. 14, No. 4. (December 2008), pp. 329-339. by Richard E. Mayer, Emily Griffith, Ilana T. Jurkowitz, Daniel Rothman
140. What Video Games Have to Teach Us About Learning and Literacy (13 March 2008) by James P. Gee

Textbook use

141. The Perceived Value of College Physics Textbooks: Students and Instructors May Not See Eye to Eye *The Physics Teacher*, Vol. 44, No. 6. (2006), 338. by Noah Podolefsky, Noah Finklestein

In Children

142. Reassessment of Developmental Constraints on Children's Science Instruction *Review of Educational Research*, Vol. 65, No. 2., pp. 93-127. by Kathleen E. Metz

III. Pedagogical Approaches and Implementation Strategies

[(tag: pedagogical_strategies) 29 articles]

Introductions to PER-based teaching Methods:

143. Teaching Physics With the Physics Suite by E. Redish
144. Five Easy Lessons: Strategies for Successful Physics Teaching (29 September 2002) by Randall D. Knight
145. PER User's Guide [http://perusersguide.org]

Tutorials

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