

# Ian David Beatty

## Curriculum Vitae

### contact information

University of North Carolina at Greensboro  
Department of Physics & Astronomy  
321 Petty Building  
PO Box 26170  
Greensboro NC 27402-6170 USA

+1.336.256.8600  
idbeatty@uncg.edu  
ian@ianbeatty.com  
<http://ianbeatty.com>  
twitter: idbeatty

### education

May 2000: Ph.D. in Physics, University of Massachusetts Amherst.

- Research area: Physics Education.
- Dissertation: *ConMap: Investigating New Computer-Based Approaches to Assessing Conceptual Knowledge Structure in Physics*.
- Recipient of Arthur Quinton Award for outstanding teaching assistant (May 1995).

May 1990: B.S. in Physics, University of Massachusetts Amherst.

- *Summa Cum Laude* honors thesis:  $O_1^+ \rightarrow O_2^+$  Electron Scattering Form-Factors in  $^{40}\text{Ca}$  and  $^{48}\text{Ca}$  (nuclear theory).
- *Sigma Xi* Science Award (1989), *Phi Beta Kappa* Key Award (1989), Hasbrouck Award for Outstanding Physics Major (1989).

### appointments

Jul 2009—present: Assistant Professor, University of North Carolina at Greensboro.

Jan 2009—Jul 2009: Visiting Assistant Professor, University of North Carolina at Greensboro.

Feb 2006—Jan 2009: Research Assistant Professor, University of Massachusetts Amherst.

Jun 2002—Feb 2006: Senior Postdoctoral Research Associate, UMass Amherst.

Jun 2000—May 2002: Postdoctoral Research Associate, UMass Amherst.

Feb 1991—May 2000 (intermittent): Research Assistant, UMass Amherst.

Sep 1991—May 2000: Teaching Assistant, UMass Amherst.

**experience**

Research on physics learning and assessment:

- Developed data-gathering instrumentation and research plan for a major research study on pedagogical change in secondary school science teachers; managed and largely directed the project; supervised graduate and undergraduate research assistants; designed and conducted professional development for in-service teachers; and led data analysis and dissemination of results (2005—present).
- Participated in a multi-university collaboration to design a “Sciences of Learning Center” focused on the development of a rich theoretical model of physics learning and knowledge use (2003—2004).
- Participated in panel discussions and working groups at invited conferences on the transfer of learning (*Transfer of Learning*, National Science Foundation, Arlington VA, March 2002), on the transformative potential of interactive pedagogies and classroom networks (*CATAALYST Workshop*, SRI International, Menlo Park CA, April 2004), and other topics.
- Advised graduate students in Physics Education Research (2002—2009).
- Conducted dissertation research on computer-based assessments of students’ evolving conceptual knowledge structures (1995—2000).
- Collaborated on many other projects within the context of an active research group (1993—present).

Teacher professional development:

- Co-designed, co-facilitated, and managed a long-term series of professional development workshops and meetings for in-service middle- and high-school science and mathematics teachers in three Western Massachusetts school systems, as part of the UMass/UNCG *Teacher Learning of Technology-Enhanced Formative Assessment* project (2006—2010; NSF grant nos. TPC-0456124 and TPC-1005652).
- Designed or co-designed and conducted or co-conducted professional development talks and workshops for groups of secondary or postsecondary teachers (e.g., for professional development day at Johnson & Wales University, Charlotte NC; for teachers of the Bahamas public education system in Nassau, Bahamas; 1996—present).

International outreach work on science teacher professional development:

- Worked with science education researchers in Argentina (Universidad Nacional de Córdoba), South Africa (many), Cyprus (Ministry of Education), and Uganda (Makerere University) to conduct secondary science teacher professional development activities and develop curricula for teacher enhancement programs (1996—present).
- Served as a visiting professor at the University of Fort Hare, Alice, Eastern Cape, South

Africa (2006).

Course and curriculum design:

- Redesigned *Conceptual Physics* (UNCG PHY 205) to accord with new General Education requirements (2009—2010).
- Redesigned *Introduction to Computational Physics* (UNCG PHY 294) and *Computational Physics II* (UNCG PHY 395) (2009—2010).
- Collaborated in the design and teaching of an innovative, activity-based *Conceptual Physics* course for Singaporean hotel and restaurant industry professionals (UMass PHYSIC 100, taught in Singapore in partnership with the Singapore Hotel Association's trade school SHATec (2005).
- Collaborated in the design and teaching of a postgraduate course in science pedagogy for future science faculty members, "Learning teaching: What every professor should know about science instruction," in the Facultad de Ciencias Químicas (Faculty of Chemical Sciences) of the Universidad Nacional de Córdoba, Argentina (2005).
- Completely redesigned and co-taught a two-semester laboratory curriculum for introductory physics majors (UMass PHYSIC 181L & 182L), for consistency with current perspectives in physics education research and pedagogy (1992—1996).

Instructional software development:

- Assisted in the design of the UMass *OWL* web-based homework system, representing the Physics Department to the system's creators in the Computer Science Department; developed software modules to extend *OWL* and collaborated in the design of *OWL*'s plug-in architecture (1998—2004).
- Designed graphical user interfaces and developed software for the NSF-funded *Physics Analysis Workbench* project (DUE-9950323, 2001—2004).
- Developed *ConMap*, a suite of computer-based tools for assessing students' conceptual knowledge association, currently used by UMass graduate students for educational research projects (1996—2004).
- Project lead, software architect, and programming team manager for development of the *Knowledge Broker*, a next-generation classroom response system using tablet PCs and wireless networking (2003—2005).

Website authoring & web application development:

- Developed and maintained websites, web applications, and course website frameworks for the UMass Physics Department, Physics Education Research Group, and Scientific Reasoning Research Institute (1996—2009).
- Developed a database-backed web application for the *Assessing-to-Learn* project (ESI-9730438), originally supporting project participants and now serving as a public

resource (2000—2005).

Computational modeling:

- In collaboration with the UMass Department of Wildlife and Fisheries Biology and the US Forest Service, developed a complex ecological computer model for multi-species forest growth and mortality and coarse woody debris accumulation in upland and riparian stands, and co-wrote the accompanying user's guide (2002—2003).

### **professional society memberships**

*American Association of Physics Teachers* (AAPT): member since Sep 2005. Member of *Physics Education Research Topical Group* (PERTG) and North Carolina Section (NCS-AAPT).

*National Association for Research on Science Teaching* (NARST): member Jan 2008 — Dec 2010.

## **research**

### **research interests**

Physics education research and general science/mathematics education research, especially:

- developing comprehensive pedagogical theory;
- theoretically modeling cognition and learning processes;
- investigating teacher change and professional development strategies; and
- exploring innovative approaches to instruction and assessment.

Professional development of science and mathematics teachers, especially focused on:

- effective use of classroom response system technology;
- student-centered instructional strategies and classroom dynamics; and
- outreach to teachers, teacher educators, and educational researchers, especially in developing countries.

Instructional technology and software development, especially:

- conceptualizing next-generation classroom response systems;
- investigating the pedagogical implications of technology design;
- developing new web applications to support instruction; and
- exploring the pedagogic possibilities afforded by new technology.

**grant funding***funded*

National Science Foundation grant TPC-0456124/TPC-1005652: *Teacher Learning of Technology-Enhanced Formative Assessment* (2005-2011), \$2,499,968. Co-PIs: W. J. Gerace, W. J. Leonard & A. P. Feldman.

Hewlett-Packard Corp. Applied Mobile Technology Solutions in Learning Environments 2003 Grant Initiative: *The Hewlett-Packard Classroom for Technology-Enabled Active Learning*, \$225,510 (2003). Co-PI: W. J. Gerace.

Microsoft Corp. external research grant for mobile computing in the classroom, \$52,098. (2003). Co-PI: W. J. Gerace.

*submitted*

Tate (CAS), Gerace (CAS), Beatty (CAS), Armstrong (CAS) & Downs (external), "Leveraging a CS Principles Course and Effective Pedagogy to Transform Introductory Computer Science in Central North Carolina and Beyond," NSF, \$748577 (federal, submitted--pending).

**publications, presentations, and other output***journal articles*

Penuel, W. R., Beatty, I. D., Remold, J., Harris, C., Bienkowski, M. & DeBarger, A. H. (submitted). "Pedagogical patterns to support interactive formative assessment with classroom response systems." *Journal of Technology, Learning and Assessment*. (Submitted Sep 2010.)

Lee, H., Feldman, A. & Beatty, I. D. (submitted). "Factors that affect teachers' implementation of technology enhanced formative assessment." *Journal of Science Teacher Education*. (Submitted Jun 2010.)

Beatty, I. D. & Gerace, W. J. (2009). Technology-enhanced formative assessment: A research-based pedagogy for teaching science with classroom response technology. *Journal of Science Education & Technology* 18(2) 146. [DOI: 10.1007/s10956-008-9140-4; <http://dx.doi.org/10.1007/s10956-008-9140-4>]

Beatty, I. D., Leonard, W. J., Gerace, W. J., & Dufresne, R. J. (2006). "Designing effective questions for classroom response system teaching." *American Journal of Physics* 74(1)

31-39. [DOI: 10.1119/1.2121753; <http://dx.doi.org/10.1119/1.2121753>]

Beatty, I. D. & Gerace, W. J. (2002). "Probing physics students' conceptual knowledge structures through term association." *American Journal of Physics* 70(7) 750–758. [DOI: 10.1119/1.1482067; <http://dx.doi.org/10.1119/1.1482067>]

#### *book chapters*

Beatty, I. D., Leonard, W. J., Gerace, W. J., & Dufresne, R. J. (2006). "Question based agile teaching: Teaching science (well) with an audience response system." In Banks, D. A. (Ed.), *Audience Response Systems in Higher Education: Applications and Cases*. Idea Group Inc., Hershey PA. [ISBN: 1-59140-947-0 (hardcover), 1-59140-948-9 (paperback), 1-59140-949-7 (e-book); <http://ianbeatty.com/files/beatty-2006qdi.pdf>]

#### *conference papers (INCOMPLETE LIST)*

Beatty, I. D. (in press). "Hidden perspectives underlying success or failure teaching with clickers." In the Proceedings of the 2011 Lilly Conference on College and University Teaching, Greensboro NC.

Beatty, I. D. & Feldman, A. (2009). "Illuminating teacher change and professional development with CHAT." *Proceedings of the Annual International Conference of the US National Association for Research in Science Teaching (NARST)*, Baltimore, MD. [<http://ianbeatty.com/files/beatty-2009itc.pdf>]

Beatty, I. D., Feldman, A., Lee, H., St. Cyr, K. & Harris, R. (2008). "Teacher learning of technology-enhanced formative assessment," a conference paper accompanying a special symposium presented at the *Annual International Conference of the US National Association for Research in Science Teaching (NARST)*, Baltimore, MD, Apr 01. [Education Resources Information Center (ERIC) #ED502258; <http://www.eric.ed.gov/ERICWebPortal/detail?accno=ED502258>]

Beatty, I. D., Gerace, W. J., Feldman, A. & Leonard, W. J. (2008). "Technology-Enhanced Formative Assessment: An Innovative Approach To Student-Centered Science Teaching." *Proceedings of the Association for Science Teacher Education (ASTE) International Conference*, St. Louis, MO. [<http://ianbeatty.com/files/beatty-2008tia.pdf>]

Gerace, W. J. & Beatty, I. D. (2005). "Teaching vs. learning: Changing perspectives on problem solving in physics instruction." *Proceedings of the 9th Common Conference of the Cyprus Physics Association and Greek Physics Association: Developments and Perspectives in Physics—New Technologies and Teaching of Science* (invited), Nicosia, Cyprus, Feb 4–6. [<http://ianbeatty.com/files/gerace-2005tlc.pdf>]

*reports*

Beatty, I. D. (2008). *TPPI: The TLT Pedagogical Perspectives Interview* (technical report beatty-2008tpp). Amherst, MA: University of Massachusetts Scientific Reasoning Research Institute. [<http://ianbeatty.com/files/beatty-2008tpp.pdf>]

Corrada-Emmanuel, A., Beatty, I. D., & Gerace, W. J. (2007). "Group Discovery with Multiple-Choice Exams and Consumer Surveys: The Group-Question-Answer Model" (technical report UM-CS-2007-047). Amherst, MA: University of Massachusetts Department of Computer Science, Sep 18. [<http://www.cs.umass.edu/publication/docs/2007/UM-CS-2007-047.pdf>]

Beatty, I. D. (2004). "Transforming Student Learning with Classroom Communication Systems" (ECAR Research Bulletin ERB0403, Feb 3). Educause Center for Applied Research. [<http://www.educause.edu/ECAR/TransformingStudentLearningwit/157511>]

Beatty, I. D. (2000). *ConMap: Investigating New Computer-Based Approaches to Assessing Conceptual Knowledge Structure in Physics*. University of Massachusetts Amherst Ph.D. dissertation. [<http://ianbeatty.com/files/beatty-2000cic.pdf>]

*presentations*

Beatty, I. D. (2011-08-01) "Teaching with clickers: How, for what, and with what mind-set?" An invited talk at the American Association of Physics Teachers 2011 Summer Meeting, Omaha NE. [<http://ianbeatty.com/aapt-2011s>]

Beatty, I. D. (2011-02-05) "Hidden perspectives underlying success or failure teaching with clickers." Workshop #128 at the 2011 Lilly Conference on College and University Teaching, Greensboro NC. [<http://ianbeatty.com/talks/lilly-2011>]

Beatty, I. D. (2010-07-20) "Key factors in teachers' success or failure adopting clicker pedagogy." Invited talk GF01 at the Summer Meeting of the American Association of Physics Teachers (AAPT), Portland OR. [<http://goo.gl/XPgM> for the Prezi]

Beatty, I. D. (2009-11-06) "Using clickers and other tools to engage students in active learning, Part 1: The Big Picture," a plenary for the faculty of Johnson & Wales University, Charlotte, NC.

Beatty, I. D. & Feldman, A. (2009-04-20). "Co-evolution of practice and pedagogy: A model for science teacher change in the context of professional development," a talk presented at the *Annual Meeting of the National Association for Research in Science Teaching*, Garden Grove, CA.

Lee, H., Feldman, A., & Beatty, I. D. (2009-04-18). "Teachers' implementation of classroom response system to perform formative assessment in secondary science/math classes," a talk presented at the *Annual Meeting of the National Association for Research in Science Teaching*, Garden Grove, CA, Apr 18.

St. Cyr, K., Beatty, I. D., Feldman, A., Gerace, W. J. & Leonard, W. J. (2009-01-08). "Teacher change facilitated by sustained school situated professional development: Exemplar learning of Technology Enhanced Formative Assessment (TEFA)," a paper presented at the *Association for Science Teacher Education (ASTE) International Conference*, Hartford, CT.

Beatty, I. D. (2008-10-24). "How do Physics students access their knowledge?", an invited seminar presented to the faculty and graduate students of the Cognitive Psychology Area of the Department of Psychology, University of North Carolina at Greensboro.

Beatty, I. D. (2008-10-24). "How do Physics students access their knowledge?", an invited seminar presented to the faculty and graduate students of the Cognitive Psychology Area of the Department of Psychology, University of North Carolina at Greensboro.

Harris, R., Lee, H., St. Cyr, K., Beatty, I., Feldman, A., Gerace, W., & Leonard, W. (2008-06-13). "Technology-enhanced formative assessment: A study of teacher change," a presentation at the *University of Massachusetts Amherst School of Education Centennial*, Amherst, MA.

Beatty, I. D. (2008-05-13). "Modeling teacher change", an invited talk presented to the Bureau of Educational Research, Department of Educational Psychology, and Department of Physics at the University of Illinois, Urbana-Champaign, IL.

Beatty, I. D. (2008-04-22). "Modeling teacher change", an invited talk presented to the Department of Physics at the University of North Carolina, Greensboro, NC.

Beatty, I. D., Feldman, A., Lee, H., St. Cyr, K. & Harris, R. (2008-04-01). "Teacher learning of technology-enhanced formative assessment," a special symposium presented at the *Annual International Conference of the US National Association for Research in Science Teaching (NARST)*, Baltimore, MD.

Feldman, A., Beatty, I. D., Leonard, W. J. & Gerace, W. J. (2008-03-24). "Technology-Enhanced Formative Assessment: An innovative approach to the teaching and learning of science," a contributed talk at the *Annual Meeting of the American Educational Research Association (AERA)*, New York, NY.

Feldman, A., Beatty, I. D., Leonard, W. J. & Gerace, W. J. (2008-01-10). "Technology-Enhanced Formative Assessment: An Innovative Approach To Student-Centered Science Teaching," a presentation to the *Association for Science Teacher Education (ASTE) International Conference*, St. Louis, MO.

Beatty, I. D. (2007-12-04). "Teacher Learning of Technology-Enhanced Formative Assessment: A research project involving secondary school science and math, classroom response systems, and teacher professional development," an invited colloquium for the University of Massachusetts STEM Institute, Amherst, MA.

Beatty, I. D. (2007-11-29). "A bleeding-edge early-adopter technophile's experience with web dissemination," an invited presentation for the *Short and Snappy Author Rights*

*Colloquy*, University of Massachusetts Amherst.

Gerace, W. J. & Beatty, I. D. (2007-06-02). "Getting started with educational research," a seminar for postgraduate students in the RNA project, Faculty of Education, University of Johannesburg, South Africa.

Beatty, I. D. (2007-02-12). "De-trivializing classroom response systems," an invited seminar for the Physics Education Research Group, Department of Physics, The Ohio State University.

Beatty, I. D. (2006-09-18). "Scaling physics the smart way: With guidance from PER—Physics Education Research for Students," a guest lecture for Physics 185 (Freshman Colloquium), University of Massachusetts Amherst Department of Physics.

Beatty, I. D., Leonard, W. J., Feldman, A., & Gerace, W. J. (2006-07-25). "Illuminating teacher learning of technology-enhanced formative assessment," contributed talk DH05 at the *Summer Meeting of the American Association of Physics Teachers (AAPT)*, Syracuse NY. AAPT Announcer 36(2) 133. [<http://ianbeatty.com/blog/?p=23>]

Gerace, W. J. & Beatty, I. D. (2005-11-25). "Learning to think with physics: A minds-on and hands-on approach to physics instruction," an invited seminar for the Pedagogical Institute, Nicosia, Cyprus.

Beatty, I. D. (2005-09-27). "Formative assessment and agile teaching: Re-framing physics instruction," an invited talk at the 90th Reunión Nacional de Física of the Asociación Física Argentina, La Plata, Argentina.

Beatty, I. D. (2005-05-02). "Methodologies for cognitive research in physics education," an invited seminar for the Grupo Enseñanza Ciencia y Tecnología, Universidad Nacional de Córdoba, Argentina.

### *workshops*

Beatty, I. D. (2010-12-28). "That was like, whoa, that was a lightning bolt," a workshop for physics and astronomy teachers participating in the *Symposium on Horizons in Astronomy and Physics Education (SHAPE)*, University of North Carolina, Chapel Hill, NC. <<http://www.physics.unc.edu/~mcneil/Symposiumprogram2010.htm>>

Beatty, I. D. (2009-11-06). "Using clickers and other tools to engage students in active learning, Part 2: Hard-Learned Lessons," a workshop for the faculty of Johnson & Wales University, Charlotte, NC.

Beatty, I. D., Gerace, W. J., Leonard, W. J., & Feldman, A. (2008-11-15). "Technology-enhanced formative assessment (TEFA) with a classroom response system," a workshop at the *Inaugural Conference on Classroom Response Systems: Innovations and Best Practices*, Delphi Center for Teaching and Learning, University of Louisville, KY.

Leonard, W. J., Beatty, I. D. & Gerace, W. J. (2008-08-19:22). "Getting Started with TEFA,"

a four-day workshop for science and mathematics teachers from the Westfield Public School District, Westfield, MA participating in the *Teacher Learning of Technology-Enhanced Formative Assessment* project.

Beatty, I. D., Gerace, W. J., Leonard, W. J. & Feldman, A. (2008-03-29). "Teaching with classroom response technology (clickers)," a workshop at the Annual National Conference of the US National Physics Teachers Association (NSTA), Boston, MA.

Phillis, R. W. & Schneider, S. E. & Lavoie, N. & Beatty, I. D. & Maloy, R. W. (2008-03-05). "Writing effective PRS questions," a workshop for the campus community by the "PRS Best Practice Fellows" project of the UMass President's Office and the UMass Amherst Center for Teaching, Amherst, MA.

Beatty, I. D. & Gerace, W. J. (2007-11-16). "Teaching Science with Technology-Enhanced Formative Assessment," an invited workshop for Bahamas public school science teachers organized by the Bahamas Ministry of Education, Nassau, Bahamas.

Gerace, W. J. & Beatty, I. D. (2007-11-06). "Question driven instruction with classroom response technology," an invited workshop for Connecticut public school teachers, Greater Hartford Academy of Math and Science, Hartford, CT.

Gerace, W. J. & Beatty, I. D. (2007-10-20). "Question driven instruction with classroom response technology," an invited workshop at the *Fall Joint Meeting of the New England Sections of the American Physical Society and the American Association of Physics Teachers (AAPPT)*, University of Connecticut, Storrs, CT.

Leonard, W. J., Beatty, I. D. & Gerace, W. J. (2007-08-14:17). "Getting Started with TEFA," a four-day workshop for science and mathematics teachers from Northampton High School, Northampton, MA participating in the *Teacher Learning of Technology-Enhanced Formative Assessment* project.

Beatty, I. D. & Gerace, W. J. (2007-06-04). "QDI+TEFA: A radical research-based pedagogy with radical results," a workshop for the Faculty of Education, University of Johannesburg, South Africa.

Beatty, I. D. & Gerace, W. J. (2007-05-31). "A research project on science teacher professional development," a workshop for the Faculty of Education, University of Johannesburg, South Africa.

Gerace, W. J. & Beatty, I. D. (2007-05-28). "Constructivism: Implications for instruction and learning," part 1 of a workshop for the Faculty of Education, University of Johannesburg, South Africa.

Beatty, I. D. & Gerace, W. J. (2007-05-28). "Formative assessment and dialogical discourse: Magic keys to constructivist, student-centered instruction," part 2 of a workshop for the Faculty of Education, University of Johannesburg, South Africa.

Leonard, W. J., Beatty, I. D. & Gerace, W. J. (2006-08). "Getting Started with TEFA," a

three-day workshop for science and mathematics teachers from Frontier Regional School, South Deerfield, MA participating in the *Teacher Learning of Technology-Enhanced Formative Assessment* project.

Gerace, W. J. & Beatty, I. D. (2006-05-25). "Agile teaching of physics," a workshop for science teachers at the Makerere University Experimental School, Kampala, Uganda.

Gerace, W. J. & Beatty, I. D. (2006-05-05). "Agile teaching of physics," a workshop for faculty and in-service science teachers at the University of KwaZulu-Natal, Durban, South Africa.

Gerace, W. J. & Beatty, I. D. (2005-11-21:24). "A constructivist approach to promoting active learning in secondary physics classes," a series of four invited workshops for physics teachers organized by the Cyprus Ministry of Education in Nicosia, Larnaka, Pafos, and Limassol, Cyprus.

Gerace, W. J. & Beatty, I. D. (2005-05-04:12). "Learning versus Teaching: What every professor should know about science instruction," an intensive short graduate course for faculty and in-service teachers of the Facultad de Ciencias Químicas, Universidad Nacional de Córdoba.

Gerace, W. J. & Beatty, I. D. (2005-04-29). "Teaching vs. Learning: A research-based approach to science instruction," an invited workshop for pre-service science teachers at Universidad Nacional de San Luis.

#### *posters*

2010 National Science Foundation DR K-12 PI Meeting, Washington DC, Dec 1-3, 2010.

Beatty, I. D. (2009-07-17). "Clickers need theory, too!," a poster presented at the Foundations and Frontiers of Physics Education Research conference, Bar Harbor ME.

Beatty, I. D., Leonard, W. J., Gerace, W. J. & Feldman, A. (2006-07-26). "Teacher learning of technology-enhanced formative assessment," contributed poster EJ07-24 at the *Summer Meeting of the American Association of Physics Teachers (AAPT)*, Syracuse NY. [[http://ianbeatty.com/files/posters/AAPT\\_2006-06\\_Poster\\_EJ07-24.pdf](http://ianbeatty.com/files/posters/AAPT_2006-06_Poster_EJ07-24.pdf)]

Ortiz, E. L., Beatty, I. D., Dufresne, R. J. & Gerace, W. J. (2007-08-01). "Using artificial neural networks to predict how students answer questions in physics," contributed poster CP-56 at the *Physics Education Research Conference of the Summer Meeting of the American Association of Physics Teachers (AAPT)*, Greensboro NC.

Ortiz, E. L., Gerace, W. J., Dufresne, R. J., & Beatty, I. D. (2006-07-25). "Investigating learning capabilities of artificial neural networks," contributed poster EJ04-01 at the *Summer Meeting of the American Association of Physics Teachers (AAPT)*, Syracuse NY. *AAPT Announcer* 36(2) 150.

Leonard, W. J., Beatty, I. D., Gerace, W. J. & Feldman, A. (2007-09). "Teacher Learning of Technology Enhanced Formative Assessment (TLT)," a poster presented at the 2007 National Science Foundation DRK-12 meeting in Washington, DC.

Leonard, W. J., Beatty, I. D., Gerace, W. J. & Feldman, A. (2006-06). "Teacher Learning of Technology Enhanced Formative Assessment (TEFA-TL)," a poster presented at the 2006 National Science Foundation DRK-12 meeting in Washington, DC.

### *electronic materials*

Beatty, I. D., Leonard, W. J., & Gerace, W. J. (2005). *Assessing-to-Learn in the Classroom* (a collection of annotated classroom response system questions and supplementary materials available to instructors using any of the Serway series of university physics textbooks). Thomson Learning. [<http://physics.brookscole.com/a2lc>]

## ***teaching***

### **2011 Spring**

PHY 291: *General Physics I With Calculus* (40 students).

PHY 321: *Modern Physics* (13 students).

PHY 496: Independent Study (1 student): *Introduction to Computational Physics*.

### **2010 Fall**

PHY 327: *Thermal Physics* (11 students).

PHY 294: *Introduction to Computational Physics* (6 students).

PHY 496: Independent Study (1 student): *The physics of sound and music*.

### **2010 Summer**

PHY 496: Independent Study (1 student): *Computer implementation of a coupled network model for generating music*.

### **2010 Spring**

PHY 205: *Conceptual Physics* (53 students).

### **2009 Fall**

PHY 205: *Conceptual Physics* (58 students).

PHY 294: *Introduction to Computational Physics* (7 students).

### **2009 Spring**

PHY 395: *Computational Physics II* (6 students).

## **service**

### **professional service**

International Advisory Board member for the South African journal *Education as Change*, ISSN 1682-3206 (2008 — present). [<http://goo.gl/DDwvA>]

Manuscript reviewer for *The American Journal of Physics*, *The Physics Teacher*, *The Physical Review: Special Topics in Physics Education Research*, *Language & Education*, *Education as Change*, and *Journal of Science Education & Technology* (2002 — present).

Web site designer, web site/server administrator, and network backup system administrator for the University of Massachusetts Scientific Reasoning Research Institute (2000 — 2009).

Web site designer and administrator for the University of Massachusetts Department of Physics (2000 — 2004).

### **awards & recognition**

Aug 13, 2009: Awarded (on behalf of the entire UMass Physics Education Research Group) the MERLOT (*Multimedia Educational Resource for Learning and Online Teaching*) *Physics Classics Award for Assessing-to-Learn*, an online database of annotated classroom response system (clicker) questions.

Dec 2009: "Reviewer of the year" for *Education as Change* (by editorial board).

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