

Ian David Beatty

Curriculum Vitae

contact information

University of North Carolina at Greensboro
Department of Physics & Astronomy
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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}Ca and ^{48}Ca (nuclear theory).
- *Sigma Xi* Science Award (1989), *Phi Beta Kappa* Key Award (1989), Hasbrouck Award for Outstanding Physics Major (1989).

appointments

Aug 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.

professional society memberships

American Association of Physics Teachers (AAPT): member since Sep 2005. Member of the

AAPT's *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

In general, my current and recent research interests fall into three synergistic areas:

- Experimentally probing and theoretically modeling the cognitive processes and structures involved in learning, knowing, and using physics;
- Developing comprehensive, integrated theoretical frameworks for describing, illuminating, and improving pedagogical approaches; and
- Developing and testing innovative, theory-driven teaching strategies, especially ones that challenge traditional notions of what physics instruction “ought” to look like.

In prior work, I have also studied the process of pedagogical change for in-service secondary school science and mathematics teachers, within the context of a sustained, intensive professional development program.

summary of research experience

As a member of a large, active physics education research PER group since 1993, I have collaborated on many different PER projects, sometimes in a leadership role and sometimes offering peripheral support. In particular:

- I developed the research plan and data-gathering instrumentation for a major NSF-funded research study on pedagogical change in secondary school science teachers; managed and largely directed the project; supervised the project's graduate and undergraduate research assistants; designed and conducted professional development for in-service teachers; and led project data analysis and dissemination of results (2005—2011).
- I have unofficially advised graduate students in Physics Education Research (2002—2009) and Science Education (2006—2012).
- I participated in a multi-university collaboration to craft a \$10M grant proposal for a “Sciences of Learning Center” focused on the development of a rich theoretical model of physics learning and knowledge use (2003—2004).
- I have participated in panel discussions and working groups at selective invited conferences on the transfer of learning (*Transfer of Learning*, National Science

Foundation, Arlington VA, March 2002), and on the transformative potential of interactive pedagogies and classroom networks (*CATAALYST Workshop*, SRI International, Menlo Park CA, April 2004).

- I conducted my dissertation research on computer-based assessments of students' evolving conceptual knowledge structures (1995—2000).

In collaboration with the UMass Department of Wildlife and Fisheries Biology and the US Forest Service, I also implemented 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).

grant funding & proposal submission

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 (2003), \$52,098. Co-PI: W. J. Gerace.

publications, presentations, and other output

peer-reviewed journal articles

- Beatty, I. D. (submitted). "Standards-based grading in introductory university physics." *Journal of the Scholarship of Teaching and Learning*. Submitted Feb 13, 2013.
- Beatty, I. D. & Feldman, A. (2012). "Viewing teacher transformation through the lens of CHAT." *Education as Change*. [[DOI: 10.1080/16823206.2012.745756](https://doi.org/10.1080/16823206.2012.745756)]
- Lee, H., Feldman, A. & Beatty, I. D. (2012). "Factors that affect science and mathematics teachers' initial implementation of Technology-Enhanced Formative Assessment using a classroom response system." *Journal of Science Education & Technology* 21(5) 523-539. [[DOI: 10.1007/s10956-011-9344-x](https://doi.org/10.1007/s10956-011-9344-x)]
- 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/](https://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](#)]
- 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](#)]

peer-reviewed 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 (peer-reviewed, invited, or corresponding to a peer-reviewed conference proposal and abstract)

- Beatty, I. D. (2013). "Improving Physics Instruction by Analyzing Video Games." *Proceedings of the 2012 Physics Education Research Conference (PERC)*, Philadelphia, PA. [<http://www.compadre.org/per/perc/2012/Detail.cfm?id=4512>]
- 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. [DOI: [10.1080/16823206.2012.745756](#)]
- Lee, H., Feldman, A., & Beatty, I. D. (2009). "Teachers' implementation of a classroom response system to perform formative assessment in secondary science/math classes." *Proceedings of the Annual International Conference of the US National Association for Research in Science Teaching (NARST)*, Baltimore, MD. [DOI: [10.1007/s10956-011-9344-x](#)]
- St. Cyr, K., Beatty, I. D., Feldman, A., Gerace, W. J. & Leonard, W. J. (2009). "Teacher change facilitated by sustained school situated professional development: Exemplar learning of Technology Enhanced Formative Assessment (TEFA)." *Proceedings of the Association for Science Teacher Education (ASTE) International Conference*, St. Louis, MO. [<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." *Proceedings of the Annual International Conference of the US National Association for Research in Science Teaching (NARST)*,

Baltimore, MD, Apr 01. [<http://www.eric.ed.gov/ERICWebPortal/detail?accno=ED502258>]

- Feldman, A., Beatty, I. D., Leonard, W. J. & Gerace, 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 (invited, editorially reviewed, or otherwise vetted)

- Beatty, I. D. (2011). "Hidden perspectives underlying success or failure teaching with clickers," article #ED530079 in the Education Resources Information Center (ERIC). [<http://www.eric.ed.gov/ERICWebPortal/detail?accno=ED530079>] (This is the conference paper for a workshop conducted at the *Lilly Conference on College and University Teaching*, Greensboro NC, Feb 4-6 2011. The paper was submitted to conference organizers on March 31 2011, but the proceedings volume was never completed due to a shortage of other submissions.)
- 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. (2004). "Transforming Student Learning with Classroom Communication Systems" (Research Bulletin ERB0403, Feb 3). Educause Center for Applied Research. [<http://www.educause.edu/library/ERB0403>]
- 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://www.eric.ed.gov/ERICWebPortal/detail?accno=ED462269>]

reports (unvetted)

- Beatty, I. D. (2008). *TPPI: The TLT Pedagogical Perspectives Interview* (technical report beatty-2008tpp). Amherst, MA: University of Massachusetts Scientific Reasoning Research Institute. [[reprint](#)]

- 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.

presentations (on research)

- Beatty, I. D. (2012-11-22) "Model-building in Physics Education Research: Many goals, many methodologies." An invited talk to the Department of Physics at the Universidad Técnica Federico Santa María, Valparaiso, Chile. [<http://ianbeatty.com/chile-per-2012>]
- 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. (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. & 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.
- 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. (2007-02-12). "De-trivializing classroom response systems," an invited seminar for the Physics Education Research Group, Department of Physics, The Ohio State University.
- Beatty, I. D., 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>]
- 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 (on research)

- 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. (2007-06-04). "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. (2007-05-28). "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.

posters

- Beatty, I. D. (2010-12-01). "Teacher learning of technology-enhanced formative assessment" a poster presented at the 2010 National Science Foundation DR K-12 Principal Investigators' 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]
- 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

course and curriculum design

At UNCG and elsewhere, I have designed or deeply redesigned many courses:

- I redesigned *Thermal Physics* (UCG PHY 327) to align with the principles of “Modeling Instruction” (2012—present).
- I redesigned *Introductory Physics I+II with Calculus* (UNCG PHY 291 & 292) to implement several research-based active learning strategies (2011—present).
- I redesigned *Conceptual Physics* (PHY 205) to implement research-based active learning strategies and to accord with new General Education requirements, including writing the proposal to renew GNS certification (2009—2010).
- I designed an entirely new curriculum for *Introduction to Computational Physics* (PHY 294) and *Computational Physics II* (PHY 395), taking a mastery learning approach and incorporating the MATLAB software package (2009—2010).
- I collaborated in the design and teaching of an innovative, intensive, 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).
- I 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).
- I 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).

*Courses marked with a * were new to me as of that semester. (Other courses were often significantly redesigned/revised.)*

teaching assignments: 2013 Fall (anticipated)

PHY 292: *General Physics II With Calculus*.

*PHY 292L: *General Physics II With Calculus Laboratory* (two sections). Aided by a team of undergraduate teaching assistants.

PHY 294: *Introduction to Computational Physics*.

teaching assignments: 2013 Spring

On research leave; no official teaching duties.

teaching assignments: 2012 Fall

PHY 292: *General Physics II With Calculus* (32 students).

*PHY 292L: *General Physics II With Calculus Laboratory* (two sections, 32 students total). I did not personally conduct these classes; instead, I designed the curriculum, and closely mentored a team of four undergraduate “learning assistants” who taught the laboratory sections and evaluated student work.

PHY 327: *Thermal Physics* (15 students).

PHY 395: *Computational Physics II* (5 students).

teaching assignments: 2012 Summer

PHY 294: *Introduction to Computational Physics* (1 student), as independent study.

teaching assignments: 2012 Spring

PHY 291: *General Physics I With Calculus* (49 students).

*PHY 291L: *General Physics I With Calculus Laboratory* (two sections, 49 students total). I did not personally conduct these classes; instead, I largely designed the curriculum, and closely mentored a team of four undergraduate “learning assistants” who taught the class sessions and evaluated student work.

PHY 495: *Research Experience in Physics* (1 student), mentoring and supervising participation in the work of the Physics Education Research Group.

teaching assignments: 2011 Fall

*PHY 292: *General Physics II With Calculus* (22 students).

PHY 294: *Introduction to Computational Physics* (12 students).

PHY 395: *Computational Physics II* (4 students).

PHY 496: Independent Study (1 student, 3 credits): *Computational Astrophysics*.

teaching assignments: 2011 Spring

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

PHY 321: *Modern Physics* (12 students).

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

teaching assignments: 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*.

teaching assignments: 2010 Summer

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

teaching assignments: 2010 Spring

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

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

teaching assignments: 2009 Fall

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

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

teaching assignments: 2009 Spring

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

(Pre-UNCCG courses not listed.)

instructional software and web development

I 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).

I 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).

I designed graphical user interfaces and developed software for the NSF-funded *Physics Analysis Workbench* project (DUE-9950323, 2001—2004).

I 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).

I acted as the 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).

I 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).

service

to the department

The Department of Physics and Astronomy is sufficiently small that it has very few official committees; most decisions are discussed and made informally by the entire faculty.

I have represented the Department of Physics & Astronomy at UNCG's "Transfer Tuesday" event for incoming transfer students (Oct 04, 2011).

I have represented the Department of Physics & Astronomy at UNCG's "Destination UNCG" event for potential entering undergraduates (April 02, 2011).

I researched, selected, and wrote an internal proposal to acquire classroom response system sets ("clickers") for several of the Department's courses.

I wrote and submitted materials to re-certify PHY 205 (*Conceptual Physics*) for the General Education GNS marker (2010).

I wrote and submitted documents to establish PHY 101 (*Methods, Skills, and Strategies for Physics*) as an experimental course (later approved as a permanent course).

to the university (while at UNCG)

I am serving on the Faculty Senate as a Senator representing the College of Arts and Sciences (Aug 2012—present).

I am serving as Faculty Senate Liaison to the Faculty Teaching and Learning Center's

Advisory Committee (Sep 2012—present).

I have acted as the unofficial chair of a currently ad-hoc working group to develop a proposal for a new Ph.D. program in Science and Mathematics Education Research in the College of Arts and Sciences (2011—present).

Upon request, I addressed Valerie Vickers' TED 599 course (*Teaching Practices and Curriculum in Science*) to discuss pedagogy for teaching with classroom response system technology.

I conducted a two-hour workshop entitled "Raise your game: Provoking more learning with clickers" for UNCG Faculty, through the Teaching and Learning Center.

I suggested the creation of a UNCG technical reports system hosted by the University Libraries, provided advice to Collections and Scholarly Resources Coordinator Stephen Dew during the system's development, and published the system's inaugural technical report (2010-2011).

I served as the extra-departmental member of a faculty search committee for the UNCG Department of Mathematics and Statistics (fall/winter 2010).

to the university (while at UMass)

I gave an invited presentation entitled "A bleeding-edge early-adopter technophile's experience with web dissemination" at the *Short and Snappy Author Rights Colloquy*, University of Massachusetts Amherst (2007-11-29).

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

to the profession: Physics Education Research

I am serving on the *Physics Education Research User Guide* Editorial Board, appointed by the Chair of the AAPT's Physics Education Research Leadership Organizing Council (2012—present).

I served on a working group at the *Foundations and Frontiers of Physics Education Research* conference to establish an updated canon of "Essential readings in and beyond PER" (2011).

I am an international Advisory Board member for the South African journal *Education as*

Change, ISSN 1682-3206 (2008—present). [<http://goo.gl/DDwvA>]

I am a 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).

I served as the web site designer, web site/server administrator, and network backup system administrator for the University of Massachusetts Scientific Reasoning Research Institute (2000—2009), for the UNCG (formerly UMass) Physics Education Research Group (199?—present), and for the University of Massachusetts Department of Physics (2000—2004).

With William Gerace, I designed and conducted a seminar on “Getting started with educational research” for postgraduate students in the RNA project, Faculty of Education, University of Johannesburg, South Africa (Jun 02 ,2007).

In addition to these service roles, I have interacted with and informally mentored science education researchers in Argentina (Universidad Nacional de Córdoba); South Africa (University of Johannesburg, Potchefstroom University, University of the North-West, University of Durban Westville, and others); Cyprus (Ministry of Education); and Uganda (Makerere University) (1996—present).

to the profession: teachers

I 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 (NSF grants TPC-0456124 and TPC-1005652; 2006—2010).

I served as a visiting professor and informal faculty mentor at the University of Fort Hare, Alice, Eastern Cape, South Africa (2006).

I have conducted or co-conducted the following talks and workshops for secondary school teachers or university faculty and instructional support staff:

- Beatty, I. D. (2013-03-02) “What do video games have to teach us about teaching and learning?” a talk 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://ianbeatty.com/shape-2013>]
- Beatty, I. D. (2013-02-28) “Provoking deep learning with clickers.” An invited workshop for faculty and staff of Appalachian State University, Boone NC. [<http://ianbeatty.com/asu-2013>]

- Beatty, I. D. (2012-11-22) "Provoking deep learning with clickers." An invited workshop for faculty and staff of the Universidad Técnica Federico Santa María, Valparaiso, Chile.
- Beatty, I. D. (2012-11-19..21) "Clickers, whiteboards, group exams, and other tactics for engaging students in active learning." An invited talk for faculty of the Universidad Técnica Federico Santa María, presented at the Vitacura, San Joaquin, and Valparaiso campuses, Chile.
- Beatty, I. D. (2012-09-01) "Provoking deep learning with clickers." An invited talk for faculty of Elon University (organized by the Office of Teaching and Learning Technologies), Elon NC. [<http://ianbeatty.com/elon-2012>]
- Beatty, I. D. (2012-05-22) "Provoking deep learning with clickers." An invited keynote at the *Turning Technologies Learning Forum*, Rowan-Cabarrus Community College, North Carolina Research Campus, Kannapolis NC. [<http://ianbeatty.com/rowan-2012>]
- Beatty, I. D. (2012-04-09) "New trends in Physics Education Research." A colloquium talk for the Department of Physics, NC A&T University, Greensboro NC. [<http://prezi.com/uowqv1onwlb/ncat-colloquium-apr-09-2012/>]
- Beatty, I. D. (2012-03-28) "New ideas from Physics Education Research that could make you rethink your teaching and learning." An invited talk for the UNCG *Research and Instruction in STEM Education (RISE) Network*, Greensboro NC.
- Beatty, I. D. (2012-03-02) "Provoking learning with clickers." An invited talk for the Graduate Teaching Seminar of the UNCG Dept. of Mathematics & Statistics, Greensboro NC.
- Beatty, I. D. (2012-02) "New ideas from Physics Education Research that could make you rethink your teaching and learning." An invited plenary at the *2012 Lilly Conference on College and University Teaching*, Greensboro NC. [<http://www.uncg.edu/tlc/lillyconference/presenters>]
- 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. (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. (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. (2011-10-09). "Raise your game: Provoking more learning with clickers," a

workshop for the Teaching and Learning Center at the University of North Carolina, Greensboro.

- 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.
- 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 Science 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 (AAPT)*, 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.

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

service 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* (awarded by editorial board).

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