

Noah Finkelstein

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Education

Physics Education

Research Post doc

Sep 1998-Sep 2001

National Science Foundation Post-doctoral Fellowship in Science Education (PFSMETE)

University of California, San Diego - Lab. of Comparative Human Cognition

University of California, Berkeley - GSE - Science and Mathematics Education

Ph.D., Applied Physics

January 1998

Princeton University, School of Engineering and Applied Science, Princeton NJ

Applied Physics and Laser Diagnostics Group

B.S., Mathematics

May 1990

Yale University, New Haven CT

minors: physics and philosophy

Experience

Research Consultant

Aug '02 - present

Harvard-Smithsonian Center for Astrophysics, Science Education Department, Cambridge MA

Physics content and physics education research specialist, Essential Science educational program for CPB/Annenberg. Identify scale, content scope, and relevant advanced technology for physical sciences segment of educational program in elementary school teacher training.

Instructor

Aug '02 - present

High Tech High School, San Diego, CA

Develop and teach advanced level physics course for 40 seniors in progressive, public school which caters to the diverse range of students in San Diego City (8th largest district in the US). Study the process of education in real-world high school environment while incorporating the latest findings of physics education research (PER). Examine the institutional, cultural, and individual divides between high school and university (in physics).

Research Fellow

Jan '98 - present

Lab of Comparative Human Cognition, University of California, San Diego, La Jolla CA

Examination of individual, contextual, and social processes of learning in both university and pre-college environments. Seek to expand relatively young field of physics education research (PER). Create and study environments which bridge the sciences and education, and the university and pre-college educational systems. Develop support and study programs for undergraduate and graduate level training in the sciences and education. Bridge educational efforts in the Physics Department, School of Engineering and Teacher Education Program. Initiate and coordinate collaborative research efforts in science education and K-14 community partnerships and outreach. Create and implement science curricula for successful in- and after-school educational outreach efforts. Initiate these collaborative ventures with San Diego City College, San Diego City School District, Ruben H Fleet Science Center, the UCSD outreach office (CREATE), UC LINKS after-school programs, and the San Diego Super Computer Center. Identify and secure grants (from NSF, American Association of Physics Teachers, UC Office of the President).

Funded as National Science Foundation Post-doctoral Fellowship in Physics Education Research (PFSMETE) Sept. '98-Sept. '01.

Advisors: Michael Cole, Lab of Comparative Human Cognition, UC San Diego, and Andrea diSessa, Graduate School of Education, UC Berkeley.

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**Lecturer and
Academic Coordinator**
Oct '01- Jul '02

*Jacobs School of Engineering, University of California, San Diego, La Jolla, CA and
Teacher Education Program, University of California, San Diego, La Jolla, CA*

Develop and teach two new courses in engineering on teaching and learning engineering — an undergraduate course on K-12 education; a graduate course on college / university education. Develop and teach adolescent development class for pre-service teachers. Develop ties between the engineering school and teacher education program. Lead efforts with newly formed faculty committee on K-14 outreach. Issues addressed include: partnerships with community colleges, admissions, developing outreach efforts for pre-college students (summer and school year- based programs, web site development). Develop, manage, and participate in teaching novel physics course for San Diego City College students, jointly offered by City College, Fleet Science Center, and graduate students at UCSD. Identify grants to support large scale, long term projects in education.

Lecturer
Mar '99- Sep '01

Department of Physics, University of California, San Diego, La Jolla, CA

Develop and teach a new course, *Physics 180: Teaching and Learning Physics*. Teach in large-scale (200 person) Physics 1 (physics with calculus) course. Develop and implement broad reforms in the laboratory portion of this sequence (introducing 27 new labs which incorporate findings from physics education research). Mentor students in independent study (Physics 199). Develop new links between Teacher Education Program and Physics, including proposal of a new joint major. Direct undergraduate mathematics and science K-12 tutors as part of Community Teaching Fellowship (a state funded outreach grant to UCSD). Critical study of conditions which foster conceptual understanding/ change in university students. Studies of both novice (1st yr. / pre-medical) and relative experts (physics majors/ graduate students), examine students' beliefs, cognitive strategies, and environmental influence on their learning.

Participate in the development, grant writing, and implementation of Preparing Future Physics Faculty, a graduate student certification program sponsored by the AAPT and NSF.

Research Associate
Sep '92 - Jan '98

Applied Physics and Laser Diagnostics Group, Princeton University, Princeton NJ

Specialization in electricity and magnetism, spectroscopy, atomic, molecular and optical physics. Developed novel laser and optical filter technologies for remote sensing and diagnostics. Collaborated with Schwartz Electro-Optics, Inc. (Concord, MA) in creating a high power, narrow-linewidth, tunable ultraviolet laser, based on an injection-seeded, cavity- locked, frequency-tripled titanium: sapphire source. Constructed and characterized ultra-narrow spectral band imaging filters for notch absorption and notch passband discrimination - currently under patent review. Participate in the identification, writing, and reporting of grants from the Air Force Office of Scientific Research, NASA Small Business Innovative Research Programs.

Ph.D. Thesis: *An UltraViolet Laser Source and Spectral Imaging Filters for Non-Intrusive, Laser-Based Diagnostics*. Advisor: Richard B. Miles Cmttee: Kevin Lehmann, Michael Littman

Instructor
Sep '94 - Sep '97

Dean of the College, Princeton University, Princeton, NJ

Coordinated and taught (6 hrs/wk) in program to review freshman level mathematics, physics, and chemistry. Responsible for group review and individual tutoring.

**Workshop Instructor /
Coordinator**
summers '95, '96, '97

Dean of the College, Princeton University, Princeton, NJ

Assisted in the design and implementation of the Summer Scholars Institute, a program for incoming freshmen predisposed towards science. Coordinated and assisted in six week workshop curriculum including week long sessions in Physics, Mechanical Engineering, Biology, Chemistry, Operations Research, and Computers. Taught computer workshop segment.

Science Advisor
Sep '95 - Dec '97

Science Alliance / Center for Science Education Bristol-Meyers Squibb, Princeton, NJ

Collaborator in reform of elementary science education in 3 local school districts. NSF supported program to begin inquiry and project based collaborative learning in elementary schools. Includes teacher education, school visits, and materials support.

Research Associate
Sep '91 - Sep '92

Lab of Comparative Human Cognition, University of California, San Diego, La Jolla CA

Engaged in elementary level after-school educational program to promote literacy. Research in cognitive theory, and developmental psychology. Analysis of distributed memory and cognition over internet communities. Programming and computer systems management.

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Sys. Design Analyst

Sep '90 - Sep '91

Reliability Engineering and Applied Physics Group, Ford Aerospace, Palo Alto CA

Development of Management Information System (MIS). Program and customize hardware and software solution for engineering group (n=40) and management.

Resident Advisor

Aug '89 - Jun '90

Timothy Dwight College, Yale University, New Haven CT

Responsible for a floor of 18 freshmen college students. Academic, social, and personal counselling. Liaison with university deans and administration.

Seminar Committee

Sep '88 - May '90

Timothy Dwight College, Yale University, New Haven CT

Recruiting, interviewing, and selection of seminars and instructors for full credit courses offered by residential college which served to compliment Yale's fixed curriculum.

Tutor

Sep '86 - May '90

Mathematics Department, Yale University, New Haven CT

Individual instruction in calculus, multivariable calculus, linear algebra, differential equations.

Honors / Awards

National Science Foundation Postdoctoral Fellow in Mathematics, Science, Engineering and Technology Education, 1998-2001

Graduate Fellowship, SPIE The International Society for Optical Engineering, 1996-97

Sigma Xi, honor society, inducted Princeton University 1994

Guggenheim Fellowship, Princeton University, 1992-93

Magna Cum Laude, Yale University, 1990

Anthony D. Stanley Prize, excellence in pure and applied mathematics, Yale University, 1989

Grants

National Science Foundation Postdoctoral Fellowship in Mathematics, Science, Engineering and Technology Education, 1998-2001 \$153,000

National Science Foundation, Interagency Educational Research Initiative: Coordinating Educational Institutions for Sustained Academic Success, 2001, co-principal investigator, \$118,496

University of California, Office of the President, Presidential Grants in Education, Explorers Dimension at the El Camino Learning Center, 2000-2001, investigator, \$23,000

University of California, Office of the President, Presidential Grants in Education, Extending K-12 Education: Issues Facing Informal Learning Programs, 1999-2001, investigator, \$18,000.

Activities

Co-organizer, Physics Education Research Conference, Boise ID, Aug 2002

Session Chair, Action Research Session, Am. Assoc. of Physics Teachers Conf, Aug 2002

Lead Scientist, SESAND, professional development institute, U.C. San Diego, summer 2002

Director, Community University Science Partnership, (CUSP) San Diego '01- present

Science Planning Group, California Science Project, U.C. San Diego, '00- present

Reviewer: National Academies: NAS, NAE, IM, NRC '01- present

Optical Society of America: Applied Optics '99-present

American Assoc. of Physics Teachers, American Journal of Physics, 01-present

Lawrence Erlbaum, Mind Culture and Activity, 00'-present

National Association of Research in Science Teaching, Conference, '99 - present

Physics Instructor, Reach for Tomorrow summer program, U.C. San Diego, '00 - present

Steering Committee, Preparing Future Physics Faculty, U. C. San Diego '99-present

Founder and Director, UCSD Science and Technology Club '98-present

Board of Directors, Hillel of San Diego, '00-present

Member, Solana Beach Coalition for Community and Education, '98-'01

Publications

Refereed Journal Papers / Books

- [1] M. Gallego and N.D. Finkelstein, "When the classroom isn't in school: The construction of scientific knowledge in an after-school setting," in R. Yerrick and W-M Roth (eds) Establishing Scientific Classroom Communities: Multiple voices of teaching and learning research, Lawrence Erlbaum, Saddle River, New Jersey, (to appear).
- [2] N.D. Finkelstein, "Learning physics in context: a study of student learning (about electricity and magnetism)," (in review)
- [3] N.D. Finkelstein, "Coordinating Instruction in Physics and Education," (in review).
- [4] N.D. Finkelstein and J. Libarkin, "Who Cares About Postdocs Anyway? Evaluating the National Science Foundation's Postdoctoral Fellowships in Science, Mathematics, Engineering and Technology Education," (in review)
- [5] N.D. Finkelstein, "Context in the Context of Physics and Learning," *Physics Education Research Conference Proceedings*, PERC publishing, September 2001.
- [6] R.B. Miles, Z. Tang, S.Zaidi, A. Yalin and N.D. Finkelstein, "High Signal-to-Noise Detection of Rotational Raman-Scattering Through Refluorescent and Dispersive Atomic Filters," *Journal of Raman Spectroscopy*, **31**,(8-9) 13 September 2000. Pages: 843-849.
- [7] N.D. Finkelstein, A.P. Yalin, and R.B. Miles, "A Dispersion Filter for Spectral and Spatial Resolution of Pure Rotational Raman Scattering," *Optics Letters*, **23**(20), Oct 15, 1998.
- [8] J.H. Grinstead, N.D. Finkelstein, and W.R. Lempert, "Frequency-locked light scattering: real-time Doppler velocimetry with closed-loop feedback control," *Applied Optics*, **37**(9), 1617, March 20, 1998.
- [9] N.D. Finkelstein, W.R. Lempert, and R.B. Miles, "Rotational Raman Scattering Measurements with a Single Mode Laser Source and Narrow Passband Filter," *Optics Letters*, **22**(8), 537, April 15, 1997.
- [10] J.H. Grinstead, N.D. Finkelstein, and W.R. Lempert, "Doppler Velocimetry in a Supersonic Jet Using Frequency Modulated Filtered Light Scattering," *Optics Letters*, **22**(5), 331, Mar 1, 1997.
- [11] J.N. Forkey, N.D. Finkelstein, W.R. Lempert, and R.B. Miles, "Demonstration and Characterization of Filtered Rayleigh Scattering for Planar Velocity Measurements," *AIAA Journal*, **34**(3), 442-448, Mar 1996.
- [12] R.B. Miles, J.N. Forkey, N.D. Finkelstein, and W.R. Lempert, "Precision Whole-Field Velocity Measurements with Frequency Scanned Filtered Rayleigh Scattering," *Proceedings of the 7th International Symposium on Applications of Laser Techniques to Fluid Mechanics*, Lisbon, Portugal, Jul 1994.

Conference Papers / Invited Addresses / Talks

- [13] N.D. Finkelstein and E. Price, "Building a culture of education into physics: training physics graduate students and post-docs in education," American Association of Physics Teachers, 125th National Meeting, Boise, ID Aug 5, 2002.
- [14] N.D. Finkelstein, "Preparing Future Physics Faculty: engaging physics graduate students in education," Two Year College Physics Conference, Palomar College, April 20, 2002 [Invited Address]
- [15] N.D. Finkelstein, "Theory & practice of combining school, community and university to promote physics," Center for Research in Educational Equity Assessment and Teaching Excellence, Faculty Research Seminar, University of California, April 9, 2002. [Invited]
- [16] N.D. Finkelstein, "Education and Teaching in Physics: what we know about the state of affairs and implications from Physics Education Research" Center for Teaching Development, Preparing Future Physics Faculty, University of California, San Diego, Feb 8 / 15, 2002.[Invited Address]
- [17] N.D. Finkelstein, O. Clay, and D.Evers, "Blurring Lines: combining school, community and university to promote physics," Postdeadline Session, American Association of Physics Teachers, Philadelphia, PA, Jan 20, 2002
- [18] N.D. Finkelstein, "The Role of Context in Physics Education," Center for Research in Mathematics and Science Education, San Diego State, Colloquium, Nov 2, 2001 [Invited]

- Research Conference, Rochester, NY, July 26, 2001. [Invited Address]
- [20] N.D. Finkelstein, "The Central Role of Context: A study of Student Learning in Electricity and Magnetism," American Association of Physics Teachers, Rochester, NY, July 25, 2001.
- [21] N.D. Finkelstein, "Evaluation of Contextual Factors in Learning Physics," National Association for Research in Science Teaching, St. Louis, MO, March 26-29, 2001.
- [22] N.D. Finkelstein and J. Libarkin, "Who Cares About Post-Doc's Anyway? Evaluating the National Science Foundation's Postdoctoral Fellowships in Science, Mathematics, Engineering, and Technology Education," National Association for Research in Science Teaching, St. Louis, MO, March 26-29, 2001. [Invited Session]
- [23] N.D. Finkelstein, "Physics Understanding in Context: a case study of student learning electricity and electric circuits," American Association of Physics Teachers, San Diego, CA, January 6-9, 2001.
- [24] N.D. Finkelstein, "Bridging Studies of Physics and Education," Physics Education Research Conference, Guelph, ON, August 3, 2000.
- [25] N.D. Finkelstein, "Contextual Dependence of Physics Learning," Physics Education Research Conference, Guelph, ON, August 2, 2000.
- [26] N.D. Finkelstein, "Coordinating Science Education, Outreach, and Research," National Association for Research in Science Teaching Annual Conference, New Orleans, LA, April 28, 2000.
- [27] N.D. Finkelstein, "Teaching Physics in Context: a model for coordinating education, outreach, and research," Department of Physics, University of Maryland, College Park, MD, March 30, 2000. [Invited Address]
- [28] N.D. Finkelstein, "Technology in Education: a means of bridging text and context?" Teacher Education Program, University of California, San Diego, March 7, 2000. [Invited]
- [29] N.D. Finkelstein, "Putting Physics in Context and Context in Physics," Center for Teaching Development, Preparing Future Physics Faculty, University of California, San Diego, Nov 5, 1999.[Invited Address]
- [30] N.D. Finkelstein, "Subverting Physics," Center for Research in Educational Equity Assessment and Teaching Excellence (CREATE), University of California, San Diego, Nov 3, 1999.[Invited Address]
- [31] N.D. Finkelstein, "Teaching, Research, and Outreach - Science Education," Gordon Conference: Innovations in College Chemistry Teaching, New London CT, June 21, 1999.
- [32] N.D. Finkelstein, "Building Lego into Afterschool Educational Programs," Fifth Dimension Afterschool Education Conference, U.C. San Diego, Riverside, and Santa Barbara, Appalachia State University, Boone, NC, and University of Ronneby, Ronneby, Sweden, May 17, 1999.[Invited Address]
- [33] A.Yalin, N.D. Finkelstein, and R.B. Miles," UltraViolet Rotational Raman Spectroscopy with a Dispersive Atomic Resonance Filter," CLEO post-deadline paper, Optical Society of America, Conference on Lasers and Electro-Optics, San Francisco, CA, May 7, 1998.
- [34] A.Yalin, N.D. Finkelstein, and R.B. Miles," UltraViolet Rotational Raman Spectroscopy with Atomic Resonance Filters," AIAA paper 98-0311, 36th Aerospace Sciences Meeting and Exhibit, Reno, NV, Jan 1998.
- [35] N.D. Finkelstein, "Stimulating and Exciting Light Activities: Lasers, Princeton and the Future," Sigma Xi public lecture series, Princeton University, Nov 9, 1997.[Invited]
- [36] W.R. Lempert, P. Wu, N.Finkelstein, and R. Miles, "Imaging Fluid Phenomena with Atomic and Molecular Vapor Filters," AIAA 97-2520, 32nd Thermophysics Conference, Aug 1997.
- [37] N.D. Finkelstein, W.R. Lempert, and R.B. Miles, "Narrow Linewidth Passband Filter and UV Laser Source for Rotational Raman Imaging," SPIE paper 3172-88, Annual Meeting: Optical Science, Engineering and Instrumentation, San Diego, CA, July 1997.
- [38] W.R. Lempert, N.D. Finkelstein, R.B. Miles, "Optical Filters for Non-Intrusive Combustion Diagnostics," Gordon Conference, Combustion Diagnostics, Plymouth, NH, July, 1997.[Invited Address]

- [39] N.D. Finkelstein, W.R. Lempert, and R.B. Miles, "Mercury Vapor Filter Technology and UltraViolet Laser Source for Flowfield Imaging," AIAA paper 97-0172, *35th Aerospace Sciences Meeting and Exhibit*, Reno, NV, Jan 1997.
- [40] ND. Finkelstein, "Recent Advances in Applied Physics- Novel Light Sources and Imaging Capabilities," Photonics and Opto-Electronics Materials Center, Annual Review, Princeton NJ, Jan, 1997.
- [41] N.D. Finkelstein, W.R. Lempert, and R.B.Miles, "Filter and Laser Technology for Advanced Imaging Diagnostics," OSA paper WG7, 80th Annual Meeting, Rochester, NY, Oct 1996.
- [42] R.B. Miles, W.R. Lempert, J.N. Forkey, and N.D. Finkelstein, "Optical Diagnostics for Flows with Density Variations," IUTAM Symposium on Variable Density Low Speed Turbulent Flows, Institut de Recherche sur les Phénomènes Hors Equilibre, Marseille, France, Jul 1996.
- [43] N.D. Finkelstein, W.R. Lempert, and R.B. Miles, "A Narrow Passband, Imaging, Re fluorescence Filter for Non-Intrusive Flow Diagnostics," AIAA 96-2269, 19th Advanced Measurement and Ground Testing Technology Conference, New Orleans, LA Jun 1996.
- [44] N.D. Finkelstein, W.R. Lempert, and R.B. Miles, "Cavity Locked, Injection Seeded Titanium: Sapphire Laser and Application to UltraViolet Flow Diagnostics," AIAA paper 96-0177, 34th Aerospace Sciences Meeting and Exhibit, Reno, NV, Jan 1996.
- [45] J.H. Grinstead, N.D. Finkelstein, W.R. Lempert, and R.B. Miles, "Frequency-Modulated Filtered Rayleigh Scattering (FM-FRS): A New Technique for Real-Time Velocimetry," AIAA paper 96-0302, 34th Aerospace Sciences Meeting and Exhibit, Reno, NV, Jan 1996
- [46] N.D. Finkelstein, W.R. Lempert, and R.B. Miles, "Mercury-Vapor Filter and UV Laser System for Rayleigh LIDAR," CLEO paper CFH4, Conference on Lasers and Electro Optics, Baltimore MD, OSA Technical Digest Volume 15, May 1995.
- [47] W.R. Lempert J.H. Grinstead, N.D. Finkelstein, and R.B. Miles, "Frequency Modulated Filtered Rayleigh Scattering (FM-FRS): A New Velocimetry Technique," CLEO '95 post-deadline paper, Conference on Lasers and Electro Optics, Baltimore MD, May 1995.
- [48] J.N. Forkey, N.D. Finkelstein, W.R. Lempert, and R.B. Miles, "Control of Experimental Uncertainties in Filtered Rayleigh Scattering Measurements," AIAA paper 95-0298, 33rd Aerospace Sciences Meeting and Exhibit, Reno, NV, Jan 1995.
- [49] R.B. Miles, W.R. Lempert, J.N. Forkey, N.D. Finkelstein, and P. Erbland, "Quantifying High Speed Flows by Light Scattering From Air Molecules," AIAA paper 94-2230, 25th Fluid Dynamics Conference, Colorado Springs CO, Jun 1994.
- [50] N.D. Finkelstein, J. Gambogi, W. Lempert, R. Miles, G. Rines, A. Finch, and R. Schwarz, "The Development of a Tunable Single frequency UltraViolet Laser Source for UV Filtered Rayleigh Scattering," AIAA paper 94-0492, 32rd Aerospace Sciences Meeting and Exhibit, Reno, NV, Jan 1994.

References

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