

PALMA J. LONGO, Ph.D.

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web page <http://www.umassd.edu/cas/biology/longo.cfm>

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EDUCATION

- 2001, **Ph.D., Science Education**, Columbia University, New York, NY.
Research Focus: Neurocognitive theory applied to teaching and learning science.
Thesis Advisor: Professor O.R. Anderson.
- 2000, M.Phil., Science Education, Columbia University, Teachers College, New York, NY.
- 1976, M.A., Human Development, Fairleigh Dickinson University, Rutherford, New Jersey.
- 1969, B.S., Biology, St. Bonaventure University, St. Bonaventure, New York.

Specialized Research, Education Programs, and Training

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|---------------------|--|
| 2007 | Blackboard Learning Systems: Instructional Design and Course Production
University of Massachusetts Dartmouth |
| 2003
Spring | Digital Teaching and Learning Portfolio Development
University of Massachusetts Dartmouth |
| 1996-1997 | Research Assistant, Professor Angela Calebrese Barton
Urban Science Education
Program in Science Education-Teachers College, Columbia University, N.Y. |
| 1991
Summer | Research Fellow, Projective Geometry
Emerson College, England |
| 1977 | Research Assistant, Professor Ruben Gur
Department of Psychology, University of Pennsylvania |
| 1967-1969
Summer | Undergraduate Research Fellow in Molecular Biology
Cold Spring Harbor Laboratory, Cold Spring Harbor, N.Y. |

SCIENCE and EDUCATION RESEARCH CONSULTANT

- May
2007-
current
- Design and Research Consultant to  MASTER OF ARTS IN TEACHING
SCIENCE EDUCATION *online!*
- 2004-
2005
- Research design, SPSS data analysis, and collaborative manuscript writing;
Nutrition Works, Mendham N.J.
- 2001-
2002
- Program Evaluator for *Meetings the Science Standards in Fall River*.
Fall River Public Schools, Fall River, MA.

APPOINTMENTS in Higher Education

2007 Spring, Massasoit Community College, Brockton, MA.

- Adjunct Professor of Biology, Human Anatomy & Physiology II (Lecture & Laboratory)

1999 - present, *University of Massachusetts Dartmouth*, N. Dartmouth, MA.

- Assistant Professor of Biology, Department of Biology

Teaching

Biology Content:

- Biology of Organisms Laboratory I, II
- Human Anatomy and Physiology Laboratory I
- Graduate Biology Seminar: *What is Life? Finding Common Ground Between Two Views*
- Graduate Biology Seminar: *Biology of Learning (new course in development)*

Science Pedagogical Content Knowledge:

- Methods and Materials for Secondary School Teachers of Biology (Undergraduate/Graduate);
- Teaching Science in the Elementary School (Undergraduate/Graduate).

Service

- Program Advisor, Master of Arts in Teaching (MAT) Biology, 2003-current.
- Academic Advisor, Undergraduate Biology Majors, 1999-current.
- Coordinator, Biology of Organisms Laboratory, 2001-2006.
- Faculty Associate in Science Education, Center Teaching and Learning (1999-2004).
- Project CONNECT, Member representing University of Massachusetts Dartmouth, Institutional collaborations to enhance the teaching Biology at Massasoit Community College, MA., 2006-2007.

South Coast Science Education Professional Development Initiatives (K-20)

- Developed and implemented a year-long professional development workshop: *Research Informing Practice: Exploring the Relationship between Color and Cognition in Long-Term Earth Science Learning*. Approved by the Rhode Island Department of Education. Earth Science Teachers at Portsmouth High School received forty-five Professional Development Credits, August 2004 - August 2005.
- Co-developed and evaluated the pilot science course, *Meeting the Science Standards in Massachusetts in Fall River*. Summer Pilot Course: Physical Science for Elementary teachers, November 2001-August 2002, Fall River, MA.
- Co-designed and implemented an integrated curriculum for: Goals 2000 Summer Institute, *Using Hispanic Literature to Infuse Interdisciplinary Spanish Language and Content within Grades 1-3 Elementary Curriculum*. March 3 & March 10, 2001; April 3 & April 11, 2001.
http://www.doe.mass.edu/frameworks/cinstitute/00/cinst_fl.html
<http://www.umassd.edu/communications/publications/alumninewsletter/interdisciplinary.cfm>
<http://www.s-t.com/daily/08-01/08-10-01/b02li077.htm>

- Co-designed and conducted a workshop: Somerset School District, *Science Curriculum Alignment to the Massachusetts Frameworks*. Southeastern IMPACT Curriculum Implementation Center at the Center for Teaching and Learning, University of Massachusetts Dartmouth, 2000-01.
- Designed and instructed, a two week workshop PEOE-Modeling with Fast Plants™, for In-service elementary teachers, July 16-27, 2001.
- Designed and conducted two workshops for UMD STEM instructors: *Research Informing Practice: What college instructors need to know about the biology of Learning: Implications for Philosophy and Practice* (Workshop I), & *Talking, Thinking, and Learning, Cognitive Tools for STEM instructors* (Workshop II). June 7, 2000 and June 14, 2000.
- Co-lead the University of Massachusetts System Wide Collaborative for Middle School Science Teacher Preparation NSF proposal for STEM, 2000, Co-Principal Investigator.
- Designed and conducted a workshop *Talking and Learning Science – Cognitive Tools for Science Teaching*. July 16-17, 1999. Massachusetts State Department of Education, Bonus Program for incoming science teachers.

Post-Secondary Science Education Initiatives

- Webpage development and maintenance. Technology Interface for Pre-service and In-service Science Teachers: (<http://www.umassd.edu/cas/biology/longo.cfm>), 2001-current.
- Designed and implemented a blended WebCT course for the Graduate Biology Seminar: *What is Life? Finding Common Ground Between Two Views*, Fall 2007.
- Designed and incorporated new Problem-Based Laboratory modules investigating humans systems, Biology of Organisms Laboratory, 2000-current.
- Designed and implemented a Problem-Based Laboratory module, *Heart Rate Variability: An Interactive Biofeedback Study in Physiological Coherence*, Spring 2007, Massasoit Community College.
- Designed and implemented an inquiry-based approach using PEOE for the Biology of Organisms Laboratory, 2000-2006.
- Instructed the Biology of Organisms Laboratory faculty on how to teach a new strategy PEOE (Predict, Explain, Observe, Explain) for Argumentation Discourse in the Laboratory, 2000-2007.
- Designed, conducted, and evaluated two action research studies with faculty in the Biology of Organisms Laboratory to determine the efficacy of a PEOE strategy, Fall 2004 & 2006.
- Lead the initial curriculum development plan for the MAT Middle School Science Program, 2000-2001, College of Arts and Sciences, UMD.
- Co-designed a Math, Science, and Technology Major Program for Elementary Education majors, 1999-2002, College of Arts and Sciences, UMD.
- Lead a seminar for Graduate Teaching Assistants, *Cognitive Tools for Teaching Biology*, Biology Department, 2000.
- Designed, conducted, and evaluated *Learning Approaches* for the freshman biology majors, Fall 1999.

1997-1998 *Lehman College, City University of New York, Bronx, NY.*

- Instructor (FTE), Science Education, Dept. Early Childhood & Elementary Education

Teaching

Science Pedagogical Content Knowledge: Science Curriculum Methods (Graduate, Undergraduate).

Advising

Faculty Advisor, Graduate Elementary Teacher Education Program.

Service

- Program Co-coordinator, Graduate Elementary Teacher Education Program;
- Seminar Leader – Teachers Scholar Program;
- Curriculum developer, New York Collaborative for Excellence in Teacher Preparation;
- Curriculum developer – NASA/MASTER Program, The Lehman Center for School/College Collaborative, Summer 1998.

<http://www.lehman.cuny.edu/deanedu/education/master/1998-07-09/index.html>

1995-1997 *Columbia University, Teachers College, New York, NY.*

- Instructor (PTE), Department of Scientific Foundations, Science Education

Teaching

Science Pedagogical Content Knowledge: Science in the Secondary School

Supervisory Experience

Supervisor, Science Student Teaching, Secondary Level, 1995-1997.

APPOINTMENTS in Elementary, Middle, and Secondary Education

1994-1984 *New York City Board of Education, New York, NY, (K-9)*

- Teacher of Integrated Science, Earth Science, and Physical Science.

1983-1984 *New York City Board of Higher Education, Hunter College HS, New York, NY*

- Teacher of Physical Science (grade 8), one year replacement appointment.

1980-1983, *Berkeley Carroll Street School, Brooklyn, NY (grades 5-12).*

- Teacher of Field Ecology, Earth Science, Environmental Science, Biology.

1979-1980 *North Middle School, Great Neck, NY (grade 7)*

- Teacher of Earth Science.

1975-1977, *Delran High School, Delran, NJ (grade 9-10)*

- Teacher of Unified Science, Biology.

1971-1974, *Collingswood High School, Collingswood, NJ (grade 10-12)*

- Teacher of Biology, AP Biology, Physical Science.

1970-1971, *Elgin High School, Elgin Oklahoma (grade 10-11)*

- Teacher of Biology, Earth Science.

PROFESSIONAL TEACHING LICENSURES

- New York State Department of Education - Biology, Chemistry (7-12);
- New Jersey State Department of Education - Science (7-12);
- Arizona State Board of Community Colleges - Biology, Psychology.

RECENT FUNDING

Pilot Study: Using Color Visual Thinking Networks to Enhance Concept and Skill

Acquisition in Nursing Fundamentals. Interdepartmental Teaching Development Grant. PI, Dr. Kathryn Gambling (Nursing), Co-PIs, Drs. Kristen Sethares (Nursing), and Palma J. Longo (Biology). \$1,000, Center for Teaching Excellence. University of Massachusetts Dartmouth, November 27, 2007.

Exploring the Relationship between Color and Cognition in Long-term Science Learning.

University of Massachusetts Dartmouth Chancellor's Research Fund/Healey Endowment, \$3,650. Principal Investigator, 2004-2005.

Massachusetts Mathematics, Science, Technology & Engineering Pipeline Fund, Massachusetts Board of Higher Education, Southeastern Regional PreK-16 Network, Phase I Planning Grant: \$10,000. Grant collaborator and Network Connector for the Southeastern Regional Network PreK-16 located at Bridgewater State College, MA, 2003-2004.


http://www.mass.edu/p_p/includes/pipeline/viewcontacts.asp?regionid=7

Meeting the Science Standards in Fall River. Eisenhower Professional Development Program, Center for Teaching and Learning, University of Massachusetts Dartmouth. \$51,949. Co-Principal Investigator, 2001-2002.

Three Educational Neuroscience Proposals are in varying stages of development:

Recruiting Color, Motion, and Heart Coherence for Conceptual Change:

A Study Investigating PC Tablet Computer Generated Visual Thinking Networks

This proposal seeks funding to develop and test a new PC tablet computer-based learning platform for constructing **Visual Thinking Networks**. *The Symphony of Learning*TM environment brings together five areas of research with respect to color, cognition, motion, emotion, and learning. Dr. Palma J. Longo as Project Director and Dr. Rebekah Nix as PI, Teacher Development Center,  University of Texas at Dallas. Proposal submission for \$400,000 to the NSF, Advanced Learning Technologies Program by April 24, 2008.

The Use of Color in Metacognitive Learning Closes the Gender Gap in Science Achievement:

A Longitudinal Study Investigating Gender Differences in Problem Solving

PI-Dr. Palma J. Longo. Potential funding sources for \$400,000-600,000 - NSF Gender in Science and Engineering or James S. McDonnell Foundation, Brain, Mind, Behavior Program.

Project ENTERP **RISE**
Educational Neuroscience Teacher Education Revitalizing Program
Research Initiatives for Sustaining Educators©

PI- Dr. Palma J. Longo, Collaborators are being sought with the National Math and Science Initiative in Texas for a \$300,000 proposal submission to the U.S. Department of Education.

PUBLICATIONS, peer review

Neurocognitive Theory Applied to Teaching and Learning Science

Longo, P.J. & Rajaniemi, T., (in revision, submitted May 2006). A new view for PEOE as a theory driven strategy for argumentation discourse in the laboratory, *J. Cell Biology Education*.

Longo, P.J., Anderson, O.R., & P. Wicht. (2002). *Visual Thinking Networking Promotes Problem Solving Achievement for 9th Grade Earth Science Students*, *The Electronic Journal of Science Education*, Vol. 7(1) [Available]. <http://www.unr.edu/homepage/crowther/ejse/ejsev7n1.html> (accessible on website).

Fisher, K., Abrams, R., Longo, P. & J. Wandersee. (2000). "Modes of knowledge mapping used". In Fisher, K., Wandersee, J., & D. Moody, *Mapping Biology Knowledge*, Kluwer Publishers, Dordrecht, Netherlands, 21-22.

Teaching Strategies

Longo-Schmit, P.J. (1975). *The Adventures of Miss Glucie*. *American Biology Teacher*. 37(4), 227-230.

Longo-Schmit, P.J. (1973). *Projects for the End of Term*. *American Biology Teacher*. 35(2), 225.

Longo-Schmit, P.J. (1973). *Molecules to Ecosphere View Emerges from Study of Student Chosen Organisms*. *American Biology Teacher*. 35(2), 66-68.

Clinical Research

Burani, J., & Longo, P. J. (2006). Low-Glycemic index carbohydrates: An effective behavioral change for glycemic control and weight management in patients with type 1 and 2 diabetes. *The Diabetes Educator*, 32(1), 78-88. (PDF-file [212 KB], accessible on website). <http://tde.sagepub.com/cgi/reprint/32/1/78>; <http://ginews.blogspot.com/2006/03/food-for-thought.html>

Manuscripts in preparation

Educational Neuroscience

Longo, P.J. *Can the causal link between color and cognition be explained by a quantum approach to visual consciousness?* *Journal of Consciousness*.

Longo, P.J. *The use of color in metacognitive learning closes the gender gap in science achievement*. To be submitted, *Science* or *The Proceedings of the National Academy of Science*.

Longo, P.J. *The birthing of an educational neuroscience research agenda – Investigating the role of color in learning: From practice, to research, to practice.* To be submitted, Mind, Brain, and Education.

Longo, P.J. *The use of color in Visual Thinking Networks promotes a robust problem solving dimensionality.* To be submitted, Metacognition and Learning.

Brown, S., & Longo, P.J. *Visual thinking networking increases student understanding of links between mathematics and biology.* To be submitted, Canadian Journal of Mathematics and Science Education.

Organismal Biology

Longo, P.J., Ferreira, T., and J. Solfvin. *Zebrafish: A novel system for investigating biofield therapies on wound healing and caudal fin regeneration.* To be submitted, the Journal of Complementary and Alternative Medicine.

Human Physiology

Longo, P.J. *Heart Rate Variability: A new interactive Problem Solving Biofeedback Study in Physiological Coherence.* To be submitted, Journal of Cell Biology Education.

POSTER and PAPER PRESENTATIONS

Selected by Peer Reviewed,

*Causal Links between Color and Cognition in Visual Thinking Networks:
Closing the Gender Gap in Science Achievement*

New findings from an experimental and interview-based design (N=140) indicate significant causal links between color and cognition for female students in terms of pre-post achievement gain, in addition to gains in concept and rule/principle based application. The higher-order thinking skill of problem solving reasoning was transferred especially for female students with low abstract reasoning abilities. A Color Encoding Reconstruction Model explains a new bridge between neuroscience and classroom practice by implicating color as distributed and functional knowledge in the brain. **Poster presented at the inaugural International Mind, Brain, and Education Society, November 2, 2007, Forth Worth, Texas.**

What happens to student learning when color is added to a new knowledge representation strategy? Implications from Visual Thinking Networking . Paper presented at National Association for Research in Science Teaching Session at NSTA, March 23, 2001, St. Louis Missouri. (ERIC Document Reproduction Services No. ED454095).

Dimensional Representational Strategies for Cognitive Structure: Issues for Science Teaching and Learning, Symposium Panel, National Association for Research in Science Teaching, March 30, 1999

Student Mapping - Strategies for design. Paper presented at the 35th Annual National Science Teachers Association Convention, Washington, D.C., March 28, 1987.

Invited,


Color in visual thinking networks significantly improves 9th graders' learning of earth science. Symposium session, "New Technology-Supported Approaches to Science Learning and Teaching". National Association for Research in Science Teaching, April 10, 2002, New Orleans, LA.

RESEARCH IN PROGRESS:

5 Studies in the domains of Educational Neuroscience, Organismal Biology, and Human Physiology, are in varying stages of conceptual development, data collection, and analysis:

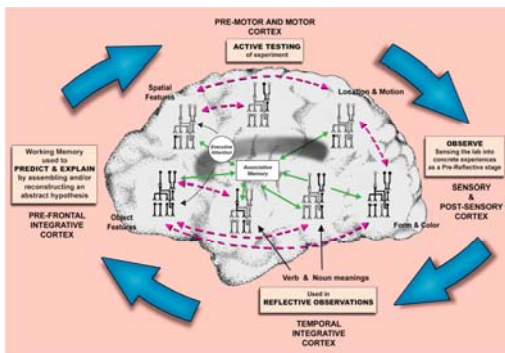
3 Educational Neuroscience Studies

Testing the role of color during the encoding and retrieving of information: Do females with high abstract reasoning aptitude encode and recall visual information in the same way as females with low abstract reasoning abilities?

In collaboration with Dr. John Hart, Medical Director of University of Texas Dallas, BrainHealth Center, and Dr. Rebekah Nix (University of Texas, Dallas) a small study has been being designed to collect behavioral and EEG data on the role of color in the encoding and retrieving information using 20 adult females who vary in high and low abstract reasoning aptitude.  Brain Health Center, Dallas, Texas. Data will be collect during December-January 2007.

To what extent does Visual Thinking Networking enhance spatial relations and abstract reasoning aptitudes in adult on-line earth science learners? The use of VTN as a metacognitive knowledge representation strategy has shown to increase long-term science achievement and problem solving reasoning for 9th grade earth science learners with low and high abstract reasoning abilities (Longo, 2002, 2007). Data will be collected from December 2007 to May 2008 to determine if adult on-line learners use of VTN for learning earth science will increase spatial relations and abstract reasoning aptitude. Collaborator, Dr. Rebekah Nix, University of Texas Dallas, On-Line MAT-Science Education Program, Integrated Earth Science for Teachers, SCI 5325.

Testing PEOE as a Model for Discourse Argumentation in the Biology Laboratory



PEOE (Predict, Explain, Observe, Explain) as developed by Thorley (1997) was a cognitive tool to enhance conceptual change in the science classroom. Longo (2006) has elevated this strategy to a theory-driven educational neuroscience model that emulates Zull's (2003) proposed natural learning cycle of the brain. A traditional "cookbook style" laboratory experiment is transformed into an active platform for developing a community of biologists. Students need opportunities to reflect about their ideas as to why events happen in the lab, so when they come together to listen to peers describe, argue, and justify their own ideas, they experience the natural world of how scientists change their theories. Pilot

testing of the model in an undergraduate biology laboratory course reveals significant changes in problem solving achievement. A replication study is being designed for further testing.

Organismal Biology – Zebrafish (*Danio rerio*)



Zebrafish – A novel system to investigate:

1. Biofield therapies on wound healing and caudal fin regeneration.

A series of pilot studies are being designed for January 2008 that will measure the efficacy of different biofield therapies on the rate of fin regeneration, proliferation of cell migration and movement and cytoskeleton activation. Gene expression patterns of *Zangptl2*, a gene that expresses angiopoietin-like proteins and *zfk8*, a candidate marker for epidermal regeneration will be analyzed. Since the Zebrafish genome is syntenic to the human genome, understanding the wound healing mechanisms in relation to biofield energies may provide complementary methods to allopathic medicine. Results from these studies will support a funding proposal for more extensive studies. **NIH/NCCAM: National Institute of Health/National Center for Complementary and Alternative Medicine R21 proposal, July 2008 PI, Dr. Palma J. Longo, Co-PI Dr. Tracie Ferreira, Dr. Jerry Solfvn.**

2. What brings about form?

This most fundamental question in biology remains unresolved. New methodologies and tools are needed to look at spatial/temporal aspects of development. The wound healing and regeneration of Zebrafish provides an excellent opportunity to study cell movement and migration. Studies are being designed that would utilize projective morphology, a non-Euclidean geometry, as a new method of predicting and tracking the differential proliferation properties as the caudal fin regenerates.

Human Physiology Study

A Pilot Study in *Heart Rate Variability*:

A new interactive Problem Solving Biofeedback Study in Physiological Coherence

Freeze-Framer™ is a biofeedback tool, developed by the HeartMath Institute that allows the individual to see the second to second changes in heart rate (beat per minute). This capacity to see the changes in the wave form of Heart Rate Variability (HRV) in relation to the changes in the levels of coherence functioning within autonomic system provides the individual with an opportunity to achieve increased physiological coherence by intentionally focusing positive emotion upon their heart.

Pilot Study: Eighteen (N = 18) community college students in an Anatomy & Physiology II course participated in a ten week study (Spring 2007) in which they collected weekly real time data on their heart rhythm signals and physiological coherence utilizing a biofeedback hardware/software protocol called Freeze-Framer™. Analysis of data is currently underway to determine if the increased levels of physiological coherence were significant.

WORKS IN PROGRESS

- a. I am currently at work on a book proposal for mainstream publishing.

Bringing the Body where it Belongs... Into Education

An emerging world view considers knowledge as being embodied. From this perspective our physical bodies provides the ground reference for our constructions of reality rather than our brain. A new framework for understanding how our brain functions tell us that perception and cognition are simultaneous events so that knowing can be viewed as seeing. “Our body and brain form an intricate web of coherent frequencies organized to translate other frequencies and nested within a hierarchy of universal frequencies” (Pearce, 2002). Emotion and cognition are forever entwined within each heartbeat. Educationally we have lost both the perspective and the significance of how the body contributes to our knowing, our learning. Policy directives on ‘educational reform’ whether at the local, state, or national level have systematically diminished and or eliminated those efforts that encourage ways of knowing through senses and our intuitive/imaginative ideas. Once tapped these inner resources can advance our human potential and transformation. A new direction is examined that is informed from a wide body of evidence that can help us move educational policy away from our current perilous path.

Tentative Chapters:

- Chapter 1. The body lost
- Chapter 2. Webs of entanglement, body and brain
- Chapter 3. Recovering the lost intelligence of the body
- Chapter 4. Lessons learned from Waldorf Schools, aesthetic education, and quantum physics
- Chapter 5. The body found, education in a new light

- b.



Gifts from a lotus, An ensemble of my lotus photographs (leaf, bud, and seed pod) are being selected and printed for a gallery exhibition. A flower petal from *Nelumbo nucifera* (the Sacred Lotus)

PROFESSIONAL DEVELOPMENT WORKSHOP in revision

The essence of these two workshops is to show how research influences practice through the lens of educational neuroscience: Part I illuminates what we know about the scientific basis for a biology of learning and what happens to student learning when theory-driven strategies are used in the classroom. It is my goal to produce an a workbook for an on-line course proposal. Part II is an experiential workshop where STEM instructors can learn how to use cognitive tools to enhance student talking, thinking, and learning. (Intended audience, K-20 teachers, supervisors, administrators).

Part I *The Biology of Learning: Implications for Philosophy and Practice - What we need to know*

Part I introduces the recent findings from developmental science, neurocognitive science, and the new discipline of neurocardiology with respect to the role of the heart and brain in learning. This newly expanded research has direct implications on our philosophy of teaching and learning with respect to the role of the teacher, the learner, and the curriculum. What we know about biology of learning can influence the nature of those learning tasks, strategies, and methods of assessment we use in the classroom.

Part II *Talking, Thinking, and Learning, Cognitive Tools for Instructors of Science*

This intensive workshop builds upon the research findings as presented in Part I. Here college as well as K-12 science teachers learn how to use different theory-driven cognitive tools that will enable their students to construct new ways of talking about, thinking about and learning science. These strategies were tested at the pre-college and college level: *PEOE* (Predict, Explain, Observe, Explain) is a cognitive tool for **talking** (Richard Thorley, University of Rochester); *VEE* (Knowledge or Epistemological Vee) is a cognitive tool for **thinking** (Bob Gowin, Cornell University); *VTN* (Visual Thinking Networking) is a cognitive tool for **learning** (Palma J. Longo, Columbia University).

HONORS

Paul Blackwood Fellowship, Teachers College, Columbia University, New York, Spring 1998.

National Science Teachers Association-American Gas Association, STAR, Science Teaching Achievement Recognition Award, for paper "*Education in Reverse*", innovative curriculum development. March 1977, \$250.00 award.

Who's Who in American Colleges and Universities, 1969.

American Institute of Aeronautics and Astronautics, Annual High School Science Award for:
The Isolation of DNA and Stability Determination by Ultraviolet Absorption Measurements 1965.

Suffolk County Science Congress, First Place Award, *The Isolation of DNA and Stability Determination by Ultraviolet Absorption Measurements* 1965.

Ford Motor Future Scientists of America Regional Award, 1965.

PROFESSIONAL SOCIETY MEMBERSHIPS

American Association for the Advancement of Science
International Mind, Brain, and Education Society
National Association for Research in Science Teaching
International Society for the Study of Subtle Energy and Energy Medicine