

## HPS&ST Note

Inter-Divisional Teaching Commission of the International Union for the History and  
Philosophy of Science  
July 2015

**Dear Colleagues,**

The following HPS&ST announcements might be of interest.

### **# *Science & Education* Current Issue (Vol. 24 Nos.4-5, July 2015)**

*Thematic Issue: The Interplay of Physics and Mathematics: Historical, Philosophical and Pedagogical Considerations*

*Guest Editor:* Ricardo Karam

RICARDO KARAM / Introduction of the Thematic Issue on the Interplay of Physics and Mathematics

STEPHEN G. BRUSH / Mathematics as an Instigator of Scientific Revolutions

HELGE KRAGH / Mathematics and Physics: The Idea of a Pre-Established Harmony

YVES GINGRAS / The Creative Power of Formal Analogies in Physics : The Case of Albert Einstein

TINNE HOFF KJELDSEN & JESPER LÜTZEN / Interactions between mathematics and physics:

The history of the concept of function - Teaching with and about nature of mathematics

EDWARD REDISH & ERIC KUO / Language of Physics, Language of Math: Disciplinary Culture and Dynamic Epistemology

RAFAEL LÓPEZ GAY, JULIO MARTÍNEZ SÁEZ & JOAQUIN MARTÍNEZ TORREGROSA / Students' Ideas and Attitudes when Using the Differential in Physics

ANDREAS REDFORS, LENA HANSSON, ORIAN HANSSON & KRISTINA JUTER / Reality - Theoretical Models - Mathematics: A ternary perspective on physics lessons in upper-secondary school

FABIANA BOTELHO KNEUBIL & MANOEL ROBERTO ROBILOTTA / Physics Teaching: Mathematics as an Epistemological Tool

RICARDO KARAM & OLAF KREY/ Quod erat demonstrandum: Understanding and explaining equations in physics teacher education

TERHI MÄNTYLÄ & ARI HÄMÄLÄINEN / Obtaining laws through quantifying experiments:

Justifications of pre-service physics teachers in case of electric current, voltage and resistance

CATHERINE RADTKA / Negotiating the boundaries between mathematics and physics: the case of late 1950s French textbooks for middle schools

MICHAEL R. MATTHEWS / Reflections on 25 years of Journal Editorship

All above contents, and details at: <http://link.springer.com/journal/11191/24/5/page/1>

### **# *Science & Education* Open Access Articles**

Springer have placed 14 articles, published between 2009 and the current issue, on its open access list. By going to the link below, pdf files of all 14 articles can be downloaded gratis.

<http://link.springer.com/search?query=&search-within=Journal&facet-journal-id=11191&package=openaccessarticles>

The downloadable articles include:

[Language of Physics, Language of Math: Disciplinary Culture and Dynamic Epistemology](#)  
(Edward Redish & Eric Kuo, 2015)

[Values and Objectivity in Science: Value-Ladenness, Pluralism and the Epistemic Attitude](#)  
(Martin Carrier, 2013)

[Science, Worldviews, and Education](#)  
(Hugh Gauch, 2009)

### # 13<sup>th</sup> Biennial International IHPST Conference

The 2015 IHPST Biennial Conference will be held in Rio de Janeiro, July 22-25, at The Federal Center of Technological Education of Rio de Janeiro (CEFET/RJ) under the co-chairmanship of Marco Braga and Andreia Guerra ([adm@abq.org.br](mailto:adm@abq.org.br))

Further details of registration, accommodation, venue and speakers are available at:  
<http://www.abq.org.br/ihpst2015/>

The preliminary program (concurrent oral session and poster session) of the Conference at the can be viewed at: <http://www.abq.org.br/ihpst2015/schedule.html>.

### # *Review of Science, Mathematics and ICT Education* Vol.9 No.1 (HPS&ST special issue)

The first issue of the 9<sup>th</sup> Volume (2015) has been published

#### CONTENTS

History, Philosophy and Science Teaching - Editorial  
*DIMITRIS KOLIOPOULOS*

On the involvement of History and Philosophy of Science in teaching Science – an approach promoting cultural content Knowledge  
*IGAL GALILI*

The Nature of Science in the French high school science syllabuses, role of the History of Science and innovative pedagogical proposals  
*LAURENCE MAURINES*

Using the History of Biology, Chemistry, Geology, and Physics to Illustrate General Aspects of Nature of Science  
*WILLIAM F. McCOMAS, KOSTAS KAMPOURAKIS*

Knowledge statements and belief statements: how do their differences matter for Science Education  
*ATHANASSIOS RAFTOPOULOS*

The contribution of history and philosophy to the conceptual approach of Physics. Old and new puzzles  
*EVANGELOS VITORATOS, SOTIRIOS SAKKOPOULOS*

All articles can be downloaded gratis at:

<http://resmicte.lis.upatras.gr/>

### # *Vale* Michael Lou Martin (1932-2015)

Michael Martin, a philosopher of science whose work was known to many in the HPS&ST community, died two months ago in Lexington Massachusetts at age 83 years. After his first teaching appointment at the University of Colorado (1962-1965), the remainder of his university career was spent in the Philosophy Department at Boston University (1965-1996). There he was a contributor to the university's stellar Centre for History and Philosophy of Science which was overseen by Robert S. Cohen and Marx W. Wartofsky.

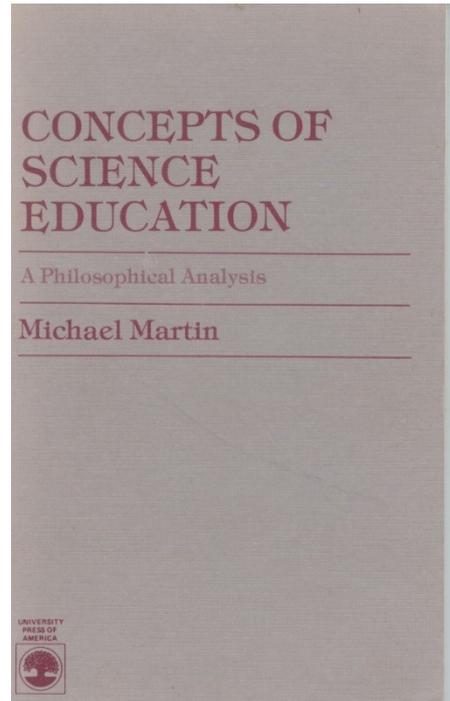
In the 1950s Michael served in the US Marine Corps where, among other things, he developed a lifelong commitment to fitness and healthy living. He spent time in gyms, including his own basic home gym, some decades before most philosophers had even formulated the concept of fitness let alone embodied it. In his early adult years he took up boxing and competed in the prestigious Golden Gloves national competition. After military service he completed his bachelor's degree in science (1956) at Arizona State University and master's degree in philosophy (1958) at the University of Arizona, then moved on to do his PhD in philosophy at Harvard University (1962).

On retirement Michael battled for almost two decades with the progressive debilitation of Parkinson's disease. Nevertheless he kept occupied with a wide range of scholarly and other engagements. He published books, edited anthologies and wrote papers on philosophy of social science and philosophy of religion; he indulged his thespian interests with a Boston amateur theatre company; he did charcoal drawings; he wrote an academy-based detective story.

Perhaps most surprising to those who knew only of Michael's philosophical life, he took up voice lessons in order to sing the demanding Schubert lieder. Jay Hullett, a former Boston philosophy colleague and now publisher, commented that 'Mike's singing Schubert was a dimension of his mind and spirit that I'd not known in all of those years in which we'd been colleagues, and it made me aware of a spiritual/artistic/poetic depth of his that, alongside his intellectual and physical power, his deep decency and generosity of spirit, made me see him as somehow an almost uniquely "complete" man'.

Michael enjoyed a long, happy and fruitful marriage to the philosopher Jane Roland Martin with whom he raised two sons, Timothy and Thomas, and with whom he enjoyed the company of five grandchildren. Doubtless he would say that his marriage to Jane was the best thing he ever did.

It was my pleasure and good fortune to meet Michael and Jane during my first sabbatical leave at Boston University's HPS Centre in 1978. They were generous and gracious hosts to an unknown, young Australian departmental visitor. Their hospitality included being welcomed to dinners at their delightful family home in Newton where listening to Jane play the family's grand piano was a special treat. I have had the good pleasure of being able to maintain fairly regular contact with them both in the intervening almost 40 years.



Michael was noteworthy for being a philosopher of science who took time to seriously engage with issues in science education at a time when only a handful of philosophers did so. His 1972 book, *Concepts of Science Education: A Philosophical Analysis* was the first English language book to address philosophical issues in science education. The book's five chapters, dealing with Inquiry, Explanation, Definition, Observation and Goals of Science Education, provide ample evidence of the usefulness of philosophical training for the improvement of instruction, texts and statements of aims and objectives in science courses. The book was republished in 1985.

Michael's 1971 paper on Objectivity, in the *British Journal for Philosophy of Science*, correctly stated that some philosophers of science - most notably Thomas Kuhn - have argued that the objective testing of scientific theories under certain circumstances is impossible. A theory in one paradigm tradition cannot contradict a theory in a different paradigm tradition since no term in the one theory means exactly the same as any term in the other theory. For the same reason no consequence of the one theory can be the same as any consequence of the other theory. Thus, according to Kuhn, theories in different paradigm traditions are incommensurable. If this is so, the standard view of scientific theory testing is incorrect, and the door is then opened to other views of theory testing and decision making, including as some would have it, politics, ideology, business interests, or in Kuhn's infamous words 'mob psychology'.

There are obvious and immediate implications of this argument for what is taught about 'the nature of science' in school science programmes. There are also implications for the orthodox justifications of making science a compulsory school subject. These implications are very close to the surface in all situations where the teaching of science needs to be defended.

Kuhn's argument had enormous influence across the academy, including in science education where it was used to launch numerous 'counter hegemonic' and supposedly 'progressive' research programmes. Michael provided a nice, careful, technical, step-by-step demolition of Kuhn's argument, showing that his premises are false and his incommensurable conclusion does not follow. A great pity that science education was at the time so distant from philosophy of science; a state of affairs neatly captured in the title of a 1985 article by Richard Duschl - 'Science Education and Philosophy of Science Twenty-five, Years of Mutually Exclusive Development'. Michael's arguments could have been profitably attended to by the many educators who were so mesmerised by

Kuhn that the discipline became a 'Kuhnian cheer squad', in the words of Cathleen Loving and William Cobern (2000).

The arguments well displayed the central point of Michael's book: seemingly technical issues in philosophy (in this case, meaning, sense, reference and theory appraisal) have consequences for practical matters in education. Get the former wrong and precious resources are wasted in the latter by travelling down blind alleys or along mistaken routes.

In a 1994 contribution to *Science & Education* on pseudoscience and the paranormal, Michael argued for his expansive, Enlightenment understanding of science education, saying:

I will maintain that learning about pseudoscience and the paranormal should be part of the goal of science education. The goal should not be to instil such beliefs in students but to get them to think *critically* about such beliefs. Science education, I will maintain, should not be narrowly conceived. The goal of science education should not just be to get students to understand science but *to be scientific*; that is, to tend to think and act in a scientific manner in their daily lives. Learning to think critically about pseudoscientific and paranormal beliefs is part of being scientific.

With the mushrooming of pseudoscientific and paranormal industries and ideologies that prey on the gullibility of so many, and for which routine education seems such an inadequate antidote – such deliberate, fostered and practised expansion of the scientific outlook or 'habit of mind' or 'scientific temper' is not an idle pedagogical indulgence. (The thematic issue on 'Pseudoscience in Society and Schools' of *Science & Education* (vol.20 nos.5-6, 2011) examines this topic.)

Michael was an avowed defender of atheism, writing several articles, books and editing anthologies on the subject. In his *Atheism: A Philosophical Justification* (1990) he provided a brief statement of the modest purpose of his defence of atheism:

The aim of this book is not to make atheism a popular belief or even to overcome its invisibility. My object is not utopian. It is merely to provide good reasons for being an atheist. Atheism is defended and justified. ... My object is to show that atheism is a rational position and that belief in God is not. I am quite aware that theistic beliefs are not always based on reason. My claim is that they should be. (p.24)

Michael was careful, informed and considered in all he wrote; the very model of an analytic philosopher. After the foregoing modest statement, he wrote:

This book has limitations not only from an atheistic point of view, but from a general philosophical one as well. ...no extended theory of rationality or justification is given. ... Indeed, it seems to me that any attempt to justify them by subsuming them under a larger theory would be premature, given the controversial state of general epistemological theories. (p.25)

But this was not an advance excuse for shallowness or cavalier treatment. The book has 476 pages followed by 53 pages of notes and references. Scholarship, detail, logical argument *and* modesty typified of all of Michael's work.

Abner Shimony, a Boston University physicist and philosopher colleague said that 'Michael did not muddy the academic waters'. At a time when obfuscatory writing and ill-informed commentary is rife in education (and elsewhere in the academy), Michael Martin's patient and clear analyses are a wonderful legacy for the discipline. So also was the never dispirited or defeatist manner in which he dealt with the cruel constrictions of the illness that progressively immobilised him and finally finished his life. He remained patient and good humoured to the end. Sadly Michael died just two weeks short of being able to celebrate with Jane the 53<sup>rd</sup> anniversary of their marriage.

All in the HPS&ST community and beyond who knew Michael and his work extend their condolences and warm wishes to Jane, his sons, and the Martin family.

Michael R. Matthews, School of Education, UNSW.

### *Some References*

- Duschl, R.A.: 1985, 'Science Education and Philosophy of Science Twenty-five, Years of Mutually Exclusive Development', *School Science and Mathematics* 87(7), 541-555.
- Loving, C.C. & Cobern, W.A.: 2000, 'Invoking Thomas Kuhn: What Citation Analysis Reveals for Science Education', *Science & Education* 9(1-2), 187-206.
- Martin, M.: 1971, 'Referential Variance and Scientific Objectivity', *British Journal for Philosophy of Science* 22(1), pp.17-26.
- Martin, M.: 1971, 'The Use of Pseudo-Science in Science Education', *Science Education* 55, 53-56.
- Martin, M.: 1972, *Concepts of Science Education: A Philosophical Analysis*, Scott, Foresman & Co., New York (reprint, University Press of America, 1985) 17-26.
- Martin, M.: 1974, 'The Relevance of Philosophy of Science for Science Education', *Boston Studies in Philosophy of Science* 32, 293-300
- Martin, M.: 1979, 'Connections between Philosophy of Science and Science Education', *Studies in Philosophy & Education* 9, 329-332.
- Martin, M.: 1984, 'Does the Evidence Confirm Theism more than Naturalism?' *International Journal for the Philosophy of Religion* 16, pp.257-262.
- Martin, M.: 1986/1991, 'Science Education and Moral Education', *Journal of Moral Education* 15(2), 99-108. Reprinted in M.R. Matthews (ed.) *History, Philosophy and Science Teaching: Selected Readings*, OISE Press, Toronto, 1991, pp.102-114.
- Martin, M.: 1987, *The Legal Philosophy of H.L.A. Hart: A Critical Appraisal*, Temple University Press, Philadelphia.
- Martin, M.: 1994, 'Pseudoscience, the Paranormal, and Science Education', *Science & Education* 3(4), 357-372.
- Martin, M.: 1990, *Atheism: A Philosophical Justification*, Temple University Press, Philadelphia.
- Martin, M.: 1993, *The Case Against Christianity*, Temple University Press, Philadelphia.
- Martin, M.: 2000, *Verstehen: A Critical Appraisal*, Transaction Books, New Brunswick, NJ.
- Martin, M. (ed.): 2007, *The Cambridge Companion to Atheism*, Cambridge University Press, Cambridge.
- Martin, M. & McIntyre, L.C. (eds): 1994, *Readings in the Philosophy of Social Science*, MIT Press, Cambridge MA.
- Martin, M. & Augustine, K. (eds): 2015 *The Myth of an Afterlife*, Roman & Littlefield, Lantham, MD.

Full curriculum vitae at: [http://infidels.org/library/modern/michael\\_martin/martin-bio.html](http://infidels.org/library/modern/michael_martin/martin-bio.html)

### **# Lessons from the Enlightenment: A Research Project**

Springer will publish an anthology on *Current Research in History, Philosophy and Science Teaching*. It will contain a section on *Lessons from the Enlightenment*. Science educators, philosophers, historians who are working in the field are kindly invited to contribute manuscripts for consideration and review.

All Enlightenment philosophers had a concern with education; they wanted their new enlightened ideas, orientations and habits of mind, to take root among citizens and to inform contemporary debate. It is this educational or pedagogical commitment that underlies their writing and lecturing in the vernacular language, publishing books and pamphlets for wide readerships, engaging in very public debate in newspapers and periodicals, editing English and French encyclopedias, and so on. They also wrote explicitly on education, with work of Locke, Condorcet, Kant, Rousseau and Priestley having great impact at the time and subsequently. The opening words of Locke's education treatise captures the Enlightenment's *zeitgeist* with its commitment to humanism, liberty, progress, the

perfectibility of individuals and society, and denial of all versions of pessimistic predestination. Their commitment to the New Science was manifest and indeed defined their identity.

The Enlightenment deserves to be a core topic in science education. Its educational, cultural, religious, political, historical and philosophical dimensions are deep, rich, and demanding. There can be productive cooperation between school science, history, religion, economics, politics and literature teachers if more were known of the scientific roots of the Enlightenment. The intimate connection of science, politics and the Enlightenment in the foundation of the United States is an obvious cross-disciplinary case study that can be repeated for just about all countries. Such cross-faculty collaboration can bring some cohesion to the fragmented subject divisions that school students' experience.

The Enlightenment tradition has many detractors, both within and outside modernism. Contemporary postmodernism is basically defined in terms of its rejection of the historic Enlightenment project; wherever postmodernism holds sway all, or most, of the Enlightenment's commitments are abandoned. The Enlightenment is out of favour in education. It is seen to be connected to ills, real and imagined, of universalism, imperialism, rationalism and patriarchy. The Enlightenment's connection to embryonic democratic movements, opposition to political and religious absolutism, support for universal human rights, secularism (as in the separation of church and state, the separation of sin from crime), freedom of the press, open debate, freedom of association, for an open and civil society, and promotion of the critical, including self-critical, spirit or habit of mind - is less often recognised.

The intention is for chapters in the section to identify 'what is living, and what is dead', in the European Enlightenment tradition, and show the tradition's connection to multifarious current issues and debates in science education.

More details can be had from the anthology editor: Michael R. Matthews ([m.matthews@unsw.edu.au](mailto:m.matthews@unsw.edu.au))

### **# *HPS&ST Handbook***

The Springer handbook of research in History, Philosophy and Science and Mathematics Teaching has been published. There are 2,544 pages in 3-volumes, with 76 chapters, written by 125 authors from 30 countries. The extensive scope of the work is reflected in the Subject Index which has 2,000 entries, the Name Index which has 3,600 entries, and the 10,200 references cited.

Where institutions purchase the e-version of the handbook (EUR650, USD700), their staff and students can download individual chapters gratis. Further, such staff and students can purchase the whole 3-volume printed work for EUR25 or USD25 (mail included). Please note that this offer is only available for students and staff whose institutions have purchased the e-version, not the more expensive printed version.

Full details at:

<http://www.springer.com/education+%26+language/book/978-94-007-7653-1>

### **# *Science Teaching: The Contribution of History and Philosophy of Science***

The 20<sup>th</sup> anniversary edition of this 1994 book has been published by Routledge. It has twelve chapters, 1,300 references, 500 pages, and 185,000 words; it provides a foundation for HPS-informed research and teaching in science education; it has been well received by philosophers, psychologists and educators.

Details at:

[www.routledge.com/9780415519342](http://www.routledge.com/9780415519342)

Through to Dec.31 2015, a 20% discount on the list price is available by citing **IRK69** in the 'discount code' box in the website order form.

A review of the book by Gürol Irzik, a Turkish philosopher of science, is available on the Springer *Science & Education* journal site, where the first few pages of the review can also be read:

<http://link.springer.com/article/10.1007/s11191-015-9754-x>

## # Coming Conferences

July 22-25, 2015, 13<sup>th</sup> IHPST International Conference, Rio de Janeiro, Brazil

Details at: <http://www.abq.org.br/ihpst2015/>

August 3-8, 2015, 15<sup>th</sup> Congress of Logic, Methodology, and Philosophy of Science, Helsinki, Finland

Details at: <http://www.helsinki.fi/clmps>

August 31 – September 4, 2015, European Science Education Research Association (ESERA), Helsinki, Finland

Details at: <http://www.esera.org/announcements/esera-announcements/esera-bi-annual-conference-to-be-held-in/>

March 17-21, 2016, Philosophy of Education Society (PES) annual conference, Toronto, Canada

Details at: <http://www.philosophyofeducation.org/conference/pes-annual-meeting-2016>

April 8-12, 2016, AERA annual conference, Washington DC.

Details at: <http://www.aera.net/>

April 14-17, 2016, NARST annual conference, Baltimore, USA

Details at: <http://www.narst.org/>

## # New IHPST Newsletter Format and Distribution

In 2015, the IHPST newsletter will get a new look and will be published quarterly by its new editor, Ami Friedman ([AmiFriedman@wlcsl.org](mailto:AmiFriedman@wlcsl.org)). This will contain book reviews and all the other enhanced information that used to be present in the old web-based newsletter format (<http://ihpst.net/recent-newsletters/>)

In the meantime, the IHPST is increasing its presence online. You can like us on Facebook ([facebook.com/IHPSTgroup](https://www.facebook.com/IHPSTgroup)) and follow us on Twitter ([twitter.com/IHPSTgroup](https://twitter.com/IHPSTgroup)) for announcements about the organization, new books, upcoming conferences.

In the coming weeks, instructions on how to subscribe to the new newsletter will be communicated on our website ([ihpst.net](http://ihpst.net)), in the next issues of the newsletter, as well as on social media.

## # Email List

This email list consists of about 6,000 individuals with interests in History, Philosophy and Science and Mathematics Teaching. They are referred to as 'IHPST Colleagues' as distinct from the much smaller group of paid, financial members of the IHPST group. The email list is used sparingly to send HPS&ST information such as contained in this message. It is a closed list, not an open discussion list.

Relevant HPS&ST information to be considered for inclusion in the monthly note should be sent direct to [m.matthews@unsw.edu.au](mailto:m.matthews@unsw.edu.au)

If you receive this email message and wish to remove yourself from the list, simply send an email message to: [ihpst-group-unsubscribe@lists.unsw.edu.au](mailto:ihpst-group-unsubscribe@lists.unsw.edu.au) . There is no need for a subject header or any message; the email itself suffices for removal from the list.

Alternatively, if you have friends, colleagues or students who would like to subscribe to the list, tell them to send a message to: [ihpst-group-subscribe@lists.unsw.edu.au](mailto:ihpst-group-subscribe@lists.unsw.edu.au) . There is no need for subject header or any message; the email itself suffices for addition to the list.