

Succeeding Michael R. Matthews An Honor and a Challenge

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1 Introduction

That history, philosophy and sociology of science (HPS) have a lot to contribute to science education has been clearly shown by this journal ever since 1992. Numerous scholars from science education, history of science, philosophy of science, sociology of science, cognitive science and other disciplines have contributed to *Science & Education* over the years. These contributions have enriched our understanding of the concepts and processes of science, which in turn has contributed to improving the teaching and learning of science. Currently, it seems that there is an increased interest for exploring the relationship between science education and HPS further. More and more science educators have started delving into the details of HPS scholarship, often in collaboration with HPS scholars. In addition, more and more HPS scholars have come to realize that they have a lot to contribute to science education, by writing articles for *Science & Education*, or chapters for anthologies devoted to theoretical or pedagogical issues in science education (e.g., Kampourakis 2013a; Numbers and Kampourakis 2015).

This journal is the most appropriate venue for scholars who want to explore how science education can be HPS-informed and HPS-enriched. It is an honor and a challenge for me to take over the editorship of *Science & Education*, succeeding its founding editor: Michael R. Matthews. My aim during my term is to continue what he has been doing for the past 25 years, and hopefully add to that. A major goal is to further expand the readership of the journal and make clear to people not (yet) related to IHPST that this is a journal of interest to all science educators. *Science & Education* is not a niche journal; it is a science education journal with a strong emphasis on conceptual and theoretical issues, which is informed by the history, philosophy and sociology of science and mathematics.

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2 Science Teaching Makes More Sense in the Light of HPS

But what does HPS have to do with science teaching? Why do science educators need to consider HPS for the teaching and learning of science content or for the development of science-related skills? Do students at schools need to acquire a very sophisticated understanding of science in order to become scientifically literate citizens? These are reasonable questions. However, HPS-uninformed science teaching, focusing on a basic understanding of science content knowledge and of the methods of science, is not enough. It is important to increase the conceptual sophistication of science education as much as possible, and the contributions of HPS scholarship are crucial for a deeper understanding of the concepts and methods of science. Let me give two concrete examples, in order to explain why.

In order to teach about concepts such as “adaptation” or “gene,” one needs to take into account not only students’ preconceptions about evolution and genetics, but also how philosophers of science have analyzed and defined these concepts. It would then be possible to realize that different kinds of definitions are used in various textbooks—or even coexist in the same one. It would also be possible to decide how to develop teaching approaches that challenge students’ preconceptions, and provide them with internally consistent concepts (e.g., Kampourakis 2013b; Burian and Kampourakis 2013). Similarly, in order to teach about nature of science (NOS), one can use simple, decontextualized activities and highly contextualized ones. The latter not only convey a more authentic portrayal of how science has been done but also one that corrects the distortions of history often found in textbooks, such as, e.g., that Mendel was a lonely and ignored pioneer of genetics who was ahead of his time (Kampourakis 2013c, 2015). To generalize: Concepts are historical entities and one needs to be aware of their history in order to properly understand their current meaning; and science should be presented as authentically as possible in order to give students a down-to-earth image of it and not an extremely idealized one. HPS provides the tools and frameworks for both purposes.

For these reasons, HPS-informed science education should be the norm and not some special case. It is not a luxury; it is a need! The extent to which HPS scholarship should be and could be taken into account in science teaching and learning has been debated extensively in some cases—for instance, in articles on teaching about NOS. In my view, a main reason for this has been what I will call the “pragmatics of science teaching,” which refers to the routine and the practical issues that teachers and students have to face everyday in their classes. These are certainly a priority for science educators. Therefore, their main concern is to help teachers in (pre-service and in-service) training programs understand how they will overcome the practical difficulties and teach their students as effectively as they can.

Teachers have a lot to deal with: They ought to be prepared to teach effectively and answer their students’ questions; they have to arouse students’ interest and make them actively participate and enjoy their science classes instead of being passive receivers of information; they must effectively and promptly fulfill all their obligations such as preparing exam papers and grading them; they need to effectively manage each class and teach while keeping students reasonably under control; they should try to overcome the anxiety of being exposed everyday to the eyes of students, and through them to their parents; and much more. A non-surprising consequence of this is that teachers often end up teaching toward some test by transmitting information and paraphrasing a textbook. Science educators have to help their teachers deal with all these difficulties. As they usually are themselves former teachers, they have both the experience and the knowledge to

prepare teachers for teaching. They can advise them how to respond to difficult situations; they can teach them how to prepare for teaching and how to teach; and they can provide them with materials for teaching. In all these cases, science educators can serve as mediators who translate the findings and conclusions of science education research to practical suggestions for teaching. Eventually, many science educators do a great job, as do those teachers who care to pay attention to them.

However, the quality of concepts taught can still be poor. For instance, genetics education is still stuck with a particular conception of gene that emerged about a century ago and became prevalent for various reasons, even though geneticists themselves used a very different conception (Allen 2014). Genetic determinism is a common view in textbooks (Gericke et al. 2014) and among biology teachers (e.g., Castera and Clement 2014). In the case of evolution, which is both conceptually challenging and politically charged, teachers may not feel confident to teach about it, even if the majority of them accept it. Research suggests that teachers' training has a big impact in this case (Berkman and Plutzer 2010). I would add that the complicated conceptual issues also make evolution a challenging topic to teach and understand (Kampourakis 2014). It is therefore necessary for science teachers to learn how to correct the misconstrued concepts, still perpetuated in textbooks and elsewhere. This is where referring to the HPS scholarship becomes necessary. We need to pay attention both to methods (how we teach and how we do research) and to conceptual issues (what we teach and on what we do research).

3 The Legacy of Michael Matthews

Although there are many scholars who have contributed significantly to bringing HPS and science education closer together, there is no single person who has done more than Michael Matthews. Michael has not only been the Editor-in-Chief of this journal for 25 years, since its inception in 1990, but also an active ambassador of HPS-informed science education. He has travelled all over the globe to numerous conferences where he has promoted IHPST and *Science & Education*. He has also been keen in bringing people to IHPST as authors and reviewers. The essays in this volume in Michael's honor provide more details about him, having been written by people who have witnessed his accomplishments over the years. Gerald Holton and Michael Ruse are two prominent HPS scholars who have known Michael for decades and who kindly accepted my invitation to write about him. I am indebted to them, as well as to Zoubeida Dagher and Peter Heering, the two IHPST Presidents during the editorial transition of this journal, who also accepted my invitation to write an essay honoring Michael, with an eye on the joint future of IHPST and *Science & Education*. There are numerous scholars who would be willing to write about Michael, and we could have whole issues with their essays. I think that the three solicited essays in this volume adequately describe Michael's contributions.

I met Michael for the first time in the 2005 IHPST conference at Leeds, UK. I had not sooner entered the reception room than he approached me, introduced himself and welcomed me to IHPST. In 2007, we met again in the IHPST conference at Calgary, Canada. At that time, I had just finished my PhD and I had published my first article in *Science & Education*, and so I proudly offered to review for the journal. Michael took this offer seriously and he invited me to review manuscripts, but also gave me the opportunity (as to many others) to guest edit thematic issues for the journal. When in September 2009 he sent out a call for a Book Review Editor, I was the only one to immediately apply for the post.

This started another fruitful cooperation with Michael for 4 whole years, until August 2013 when Charbel El-Hani took over. Having worked with Michael on journal issues and book reviews for several years and having enjoyed both our cooperation and working for the journal, I could not refrain from applying for the editorship when the announcement came out. The IHPST Group honored me, as I have already noted, and I hope that I will contribute to a smooth transition from the “Michael Matthews” era to the “IHPST” era of *Science & Education*—this is of course just semantics, as IHPST and Michael have always been close and will hopefully be close enough after his retirement.

No matter what the next editors, including myself, will do, Michael Matthews will always be the founding editor of the journal. He will also, most likely, be the one with the longest term. I seriously doubt that anyone will have the power and the willingness to devote one’s efforts for so many years to editing the journal. But it was due to Michael’s devotion that such an important accomplishment became possible. For me, and the other members of the editorial team, who take over a journal already established, life is certainly simpler. However, the task of our new editorial team is perhaps more demanding: We have to at least maintain the high quality of scholarship published in the journal and also efficiently express the interests of the IHPST Group. For 25 years, Michael has been actively doing both, by urging IHPST people to submit to the journal and *Science & Education* authors and reviewers to participate in the IHPST Group. Gladly, there has been a happy end in this long-term relationship between the IHPST Group and *Science & Education*, which became formal thanks to the efforts of the Presidents of IHPST Bill McComas, David Rudge, Michael Clough and Peter Heering.

4 Looking Forward

In this new era of *Science & Education*, I believe that its founding Editor, Michael Matthews, will continue to be actively involved in promoting both IHPST and the journal from Australia. The new editorial team consists of scholars working in different continents: Associate Editors Alice Wong and Ross Nehm live in Asia and North America, respectively; Charbel El-Hani, the Book Review Editor, lives in South America, whereas I live in Europe. Therefore, and this is not a coincidence, in every continent there is one of us. At this point, I must note how grateful I am to these scholars who have agreed to serve as editors of *Science & Education* during my editorship. This is a really challenging task, and I will always be grateful for their cooperation and support. I hope that in 5 years from now an effective transition will have been completed and everything will be ready for a new editorial team to take over. I will endeavor to make this transition from Michael Matthews to a new editorial team smooth and effective. Whether this will be possible, history will tell!

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