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978-0-521-88015-2 - Innovation in Astronomy Education

Jay M. Pasachoff, Rosa M. Ros and Naomi Pasachoff

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INNOVATION IN ASTRONOMY EDUCATION

Astronomy leads to an understanding of the history and nature of science, and attracts many young people to education in science and technology. But while in many countries astronomy is not part of the standard curriculum, many scientific and educational societies and government agencies have produced materials and educational resources in astronomy for all educational levels. This volume highlights the general strategies for effective teaching and introduces innovative points of view regarding methods of teaching and learning, particularly those using new technologies. Technology is used in astronomy, both for obtaining observations and for teaching. The book also presents ideas for how astronomy can be connected to environmental issues and other topics of public interest. This valuable overview is based on papers and posters presented by many of the world's leading astronomy educators at a Special Session of the International Astronomical Union General Assembly in Prague in 2006.

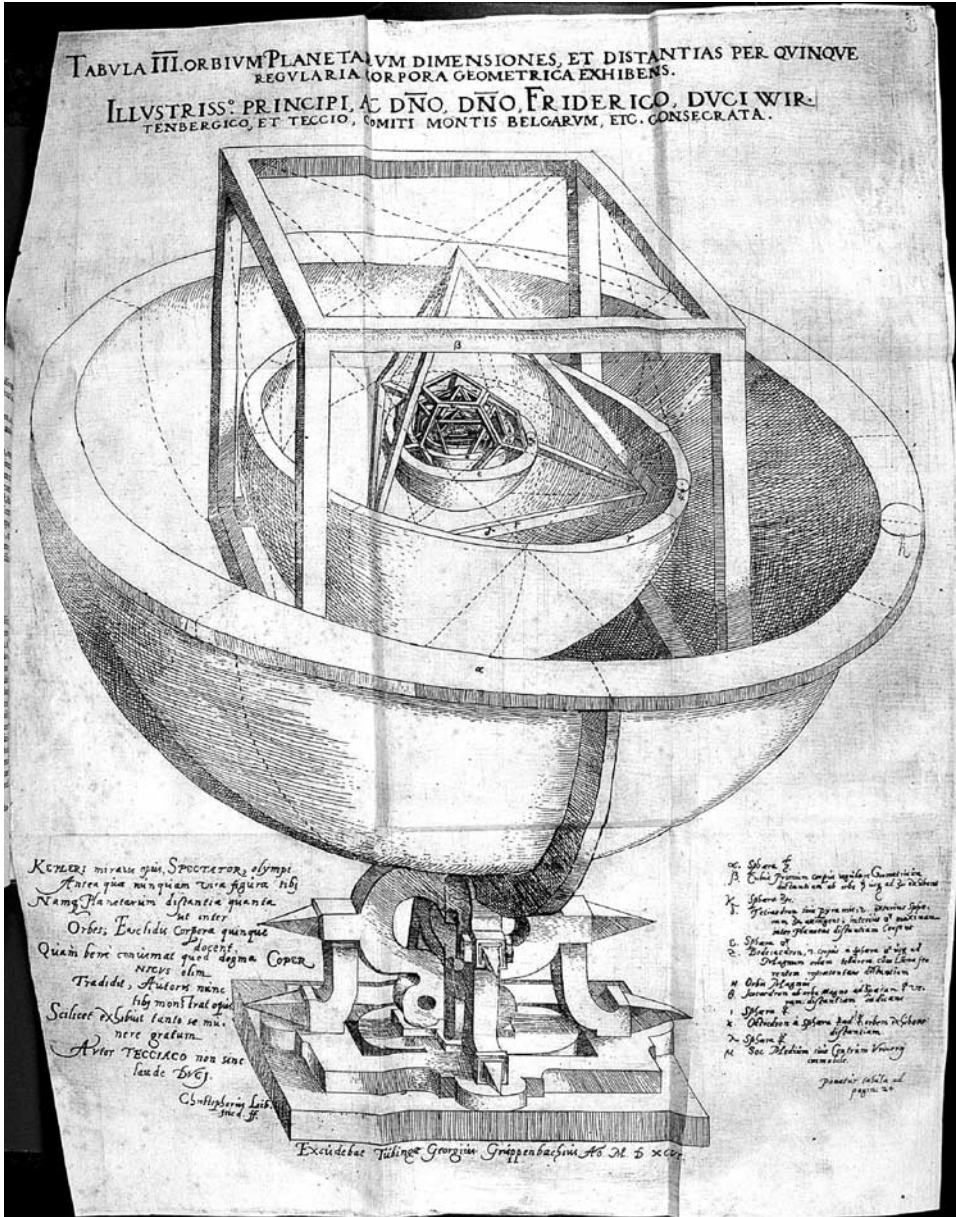
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Cover: The Astronomical Clock of Prague, one of the main tourist sites in this city that hosted the 2006 International Astronomical General Assembly, in which the Special Session on which this book is based was included. The clock shows the Sun's position in the sky, the lunar phase, the zodiac, the positions of the Sun and Moon on the ecliptic, and other items of interest to astronomers. The oldest part of the clock dates back to 1410, though the clock's current appearance comes from major repairs after World War II devastation. Moving statues, for which tourists gather on the hour, were added in the seventeenth century. (Richard Nebesky/Lonely Planet Images/Getty Images)

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[More information](#)



Johannes Kepler's heliocentric idea, from his *Mysterium Cosmographicum* (1596), that the planets' spacing was determined by the Platonic solids. Kepler moved to Prague, the site of the International Astronomical Union's 2006 General Assembly at which this Special Session on Innovation in Teaching and Learning Astronomy was held, to work with Tycho Brahe, leading to Kepler's three laws of planetary motion. (Photo courtesy of Jay M. Pasachoff with the assistance of Wayne Hammond, Williams College's Chapin Library.)

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Contents

<i>Preface</i>	<i>page xi</i>
Part I General strategies for effective teaching	1
Introduction	3
1 Main objectives for the meeting on innovation in teaching/learning astronomy Jay M. Pasachoff and Rosa M. Ros	11
2 Learning astronomy by doing astronomy John R. Percy	13
3 Hands-On Universe – Europe (EU-HOU) Roger Ferlet	23
4 Life on Earth in the atmosphere of the Sun: a multimedia manual E. V. Kononovich, T. V. Matvejchuk, O. B. Smirnova, G. V. Jakunina, and S. A. Krasotkin	27
5 A model of teaching astronomy to pre-service teachers Bill MacIntyre	32
6 How to teach, learn about, and enjoy astronomy Rosa M. Ros	39
7 Clickers: a new teaching tool of exceptional promise Douglas Duncan	48
8 Educational opportunities in pro–am collaboration Richard Tresch Fienberg and Robert Stencel	55
9 Teaching history of astronomy to second-year engineering students at the University of Chile José Maza	58
	v

vi	<i>Contents</i>	
10	Teaching the evolution of stellar and Milky Way concepts through the ages: a tool for the construction of a scientific culture using astrophysics	
	G. Theureau and L. Klein	62
11	International Astronomical Union – education programs	
	Jay M. Pasachoff	70
12	Astronomy in culture	
	Magda Stavinschi	75
13	Light pollution: a tool for astronomy education	
	Margarita Metaxa	85
14	Worldwide distance-learning university astronomy	
	Stewart Eyres, Barbara Hassall, and Ian Butchart	91
15	Edible astronomy demonstrations	
	Donald Lubowich	98
16	Amateur astronomers as public outreach partners	
	Michael A. Bennett	106
17	Does the Sun rotate around Earth or does Earth rotate around the Sun? An important aspect of science education	
	Syuzo Isobe	110
18	Using sounds and sonifications for astronomy outreach	
	Fernando J. Ballesteros and Bartolo Luque	113
19	Teaching astronomy and the crisis in science education	
	Nick Lomb and Toner Stevenson	116
20	Astronomy for all as part of a general education	
	J. E. F. Baruch, D. G. Hedges, J. Machell, K. Norris, and C. J. Tallon	122
21	Cosmic deuterium and social networking software	
	Jay M. Pasachoff, Terry-Ann K. Suer, Donald A. Lubowich, and Tom Glaisyer	128
	Poster highlights	132
	Astronomy in the laboratory	
	Bunji Suzuki	132

Contents	vii
Crayon-colored planets: using children's drawings as guides for improving astronomy teaching Ana Beatriz de Mello, D. N. Epitácio Pereira, E. A. M. Gonzalez, R. V. Nader, and B. C. G. Lima	134
Challenges of astronomy: classification of eclipses S. Vidojevic and S. Segan	135
Malargüe light pollution: a study carried out by measuring real cases B. García, A. Risi, M. Santander, A. Cicero, A. Pattini, M. A. Cantón, L. Córica, C. Martínez, M. Endrizzi, and L. Ferrón	135
Simple, joyful, instructive: ignite the joy for astronomy Yasuharu Hanaoka and Shinpei Shibata	138
Successive innovative methods in introducing astronomy courses Tapan K. Chatterjee	139
The 2005 annular eclipse: a classroom activity at EPLA Herminia Filgaira-Alcalá	139
The Armagh Observatory Human Orrery M. E. Bailey, D. J. Asher, and A. A. Christou	140
What mathematics is hidden behind the astronomical clock of Prague? Michal Krizek, Alena Solcová, and Lawrence Somer	142
<i>Solar System – Practical Exercises and Astronomy – Practical Works for secondary scholars</i> Aleksandar S. Tomic	143
Astronomy in the training of teachers and the role of practical rationality in sky observation Paulo S. Bretones and M. Compiani	143
Part II Connecting astronomy with the public	145
Introduction	147
22 The IAU Working Group on communicating astronomy with the public: status report Dennis R. Crabtree, Lars Lindberg Christensen, and Ian Robson	151
23 Astronomy outreach: informal education Julieta Fierro	156
24 Integrating audio and video podcasting into existing E/PO programs Aaron Price	160
25 The IAU's communication strategy, hands-on science communication, and the communication of the planet definition discussion Lars Lindberg Christensen	163

viii	<i>Contents</i>	
26	Getting a word in edgeways: the survival of discourse in audiovisual astronomy	
	T. J. Mahoney	177
27	A critical evaluation of the new Hall of Astronomy of the University of Mexico Science Museum	
	Silvia Torres-Peimbert and Consuelo Doddoli	183
28	Revitalizing astronomy teaching through research on student understanding	
	Timothy F. Slater	189
29	The TENPLA project (1): popularization of astronomy under cooperation between students and educators in Japan	
	M. Hiramatsu, K. Kamegai, N. Takanashi, and K. Tsukada	198
30	The TENPLA project (2): activities for the popularization of astronomy	
	K. Kamegai, M. Hiramatsu, N. Takanashi, and K. Tsukada	199
	Poster highlights	203
	An astronomer in the classroom: Observatoire de Paris's partnership between teachers and astronomers	
	Alain Doressoundiram and Caroline Barban	203
	Astronomy and space sciences in Portugal: communication and education	
	Pedro Russo and Mariana Barrosa	204
	Gemini Observatory outreach	
	Maria Antonieta Garcia	204
Part III	Effective use of instruction and information technology	207
	Introduction	209
31	ESO's astronomy education program	
	Douglas Pierce-Price, Claus Madsen, Henri Boffin, and Gonzalo Argandoña	212
32	US student astronomy research and remote observing projects	
	Mary Ann Kadooka, James Bedient, Sophia Hu, Rosa Hemphill, and Karen J. Meech	218
33	A global network of autonomous observatories dedicated to student research	
	Richard Gelderman	226

<i>Contents</i>	ix
34 Remote telescopes in education: report of an Australian study David H. McKinnon and Lena Danaia	233
35 Visualizing large astronomical data holdings C. Christian, A. Conti, and N. Gaffney	243
Poster highlights	245
An educational CD-Rom based on the making of the Second Guide Star Catalogue R. L. Smart, G. Bernardi, and A. Vecchiato	245
Astronomia.pl portal as a partner for projects aimed at students or the public Krzysztof Czart and Jan Pomierny	245
Development of a remote cooperative observation system for telescopes with P2P agent network by using location information Takuya Okamoto, Seiichi X. Kato, Yuji Konishi, and Masato Soga	247
Image processing for educators in Global Hands-On Universe James P. Miller, C. R. Pennypacker, and G. L. White	248
The Pomona College undergraduate 1-meter telescope, astronomy laboratory, and remote observing program B. E. Penprase	250
Part IV Practical issues connected with the implementation of the 2003 IAU resolution on the Value of Astronomy Education, passed by the IAU General Assembly, 2003	251
Introduction	253
36 Stellar evolution for students of Moscow University E. V. Kononovich and I. V. Mironova	258
37 Astronomy for everybody: an approach from the CASAO/NAUH view María Cristina Pineda de Carías	262
38 Toward a new program in astronomy education in secondary schools in Turkey Z. Aslan and Z. Tunca	272
39 Universe awareness for young children: some educational aspects and a pilot project Cecilia Scorza, George Miley, Carolina Ödman, and Claus Madsen	276
40 Education in Egypt and Egyptian response to eclipses Ahmed A. Hady	281

x	Contents	
41	Astronomy in the cultural heritage of African societies Paul Baki	288
42	Education at the Pierre Auger Observatory: movies as a tool in science education Beatriz García and Cristina Raschia	293
43	Freshman seminars: interdisciplinary engagements in astronomy Mary Kay Hemenway	300
44	Astronomy for teachers Julieta Fierro	306
45	Daytime utilization of a university observatory for laboratory instruction John R. Mattox	310
	Poster highlights	315
	Astronomy education in the Republic of Macedonia O. Galbova and G. Apostolovska	315
	L'Aula del Cel: communicating astronomy at school level A. T. Gallego, A. Ortiz-Gil, and M. Gómez Collado	315
	Gemini Observatory's innovative education and outreach for 2006 and beyond Janice Harvey	316
	A history of astronomy teaching in Serbian schools S. Vidojevic and S. Segan	317
	News from the Cosmos: daily astronomical news web page in Spanish Amelia Ortiz-Gil	317
	Reproduction of William Herschel's metallic mirror telescope N. Okamura, S. Hirabayashi, A. Ishida, A. Komori, and M. Nishitani	318
	History of Ukrainian culture and science in astronomical toponymy Iryna B. Vavilova	321
	The Universe: helping to promote astronomy Rosa M. Ros and Javier Moldón Vara	321
	Astronomy education in Ukraine, the school curriculum, and a lecture course at Kyiv Planetarium N. S. Kovalenko, K. I. Churyumov, and E. V. Dirdovskaya	323
	Conclusions	324
	<i>Author index</i>	325
	<i>Index</i>	329

Preface

This book is based on the proceedings of a conference on education in astronomy. On August 17 and 18, 2006, the International Astronomical Union's Commission on Astronomy Education and Development held a Special Session at the IAU General Assembly in Prague. The session, on Innovation in Teaching/Learning Astronomy, was organized around four themes: (1) general strategies for effective teaching, (2) connecting astronomy with the public, (3) effective use of instruction and information technology, and (4) practical issues connected with the implementation of the 2003 IAU Resolution that recommended including astronomy in school curricula, assisting schoolteachers in their training and backup, and informing them about available resources. Approximately 40 papers were presented orally; in addition, 60 poster papers were displayed.

Some of these topics had been considered in the Special Session at the 25th General Assembly in 2003 in Sydney, the subject of a book published in 2005, Jay M. Pasachoff and John R. Percy, *Teaching and Learning Astronomy: Effective Strategies for Educators Worldwide* (Cambridge University Press, 2005). But it is necessary to continue and extend the work started then in order to increase the quality and quantity of astronomy in schools.

The Organizing Committee for the conference consisted of:

Rosa M. Ros (Spain, co-chair), *Spanish National Liaison to IAU Commission 46; Vice-President of the Commission 2006–2009*

Jay M. Pasachoff (USA, co-chair), *President, IAU Commission 46*

Michael Bennett (USA), *Executive Director, Astronomical Society of the Pacific*

Julieta Fierro (Mexico), *Former President of IAU Commission 46*

Michele Gerbaldi (France), *Chair, IAU International Schools for Young Astronomers Program Group*

Petr Heinzel (Czech Republic), *Astronomical Institute of the Czech Academy of Sciences*

Bambang Hidayat (Indonesia), *Bosscha Observatory, Institute of Technology Bandung, Past Vice-President of the IAU*

Syuzo Isobe (Japan), *Former President of IAU Commission 46*

Edward Kononovich (Russia), *Russian National Liaison to IAU Commission 46*

Margarita Metaxa (Greece), *Greek National Liaison to IAU Commission 46*

John R. Percy (Canada), *Former President of IAU Commission 46*

Magda Stavinschi (Romania), *Astronomical Institute of the Romanian Academy of Sciences; President of the Commission 2006–2009*

Richard West (Germany), *Former Chair, Department of Outreach and Education, European Southern Observatory*

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Frontmatter
[More information](#)

xii *Preface*

Lars Lindberg Christensen (Germany, webmaster), *PIO/Head of Communication, ESA Hubble/James Webb Space Telescope, IAU Press Officer*

The meeting was supported not only by Commission 46 on Education and Development but also Commission 41 on the History of Astronomy and Division XII on Union-wide Activities.

Over 400 astronomers and educators from 63 countries registered for this conference. The conference was part of the triennial General Assembly of the International Astronomical Union, which this year gained notoriety from the resolution defining the word “planet” and putting Pluto and some other objects in a new category of “dwarf planet.” One of the papers in this symposium, by Lars Lindblad Christensen, dealt with public-information aspects of that situation – which may wind up continuing until the next IAU General Assembly to be held in Rio de Janeiro in 2009.

We thank all the authors and other contributors.

Prague was a particularly apt site for a conference on astronomy, since Tycho Brahe and Johannes Kepler did so much important work there. It is particularly suitable that this book is available in time for the International Year of Astronomy (www.astronomy2009.org), which commemorates the 400th anniversary of the 1609 work of Galileo and Kepler.

We acknowledge the generous support of the International Astronomical Union and its Executive Committee, both in the form of travel grants for some participants and in the form of moral support for the importance of education. Many other participants received support from their institutions or countries, and we are grateful to those who made sure that these individuals could attend and participate.

We dedicate this book to Syuzo Isobe of Japan, past President of Commission 46 (2000 to 2003), who died on 31 December 2006. Accounts of his life and work appeared in the March 2007 edition of the Commission 46 Newsletter, which is accessible through the Commission’s Website at www.astronomyeducation.org.

We thank Javier Moldón of the University of Barcelona for helping to organize the Special Session. We thank Madeline Kennedy for her assistance at Williams College with the preparation of this book and for compiling the index. We are grateful for some financial support from Williams College for work carried out on the educational activities of our International Astronomical Union Commission on Research and Development. The participation of one of us (J.M.P.) in the Prague General Assembly was supported in part by a research grant from the Planetary Sciences Division of NASA and by a travel grant from the US National Science Foundation through the American Astronomical Society.

At Cambridge University Press, we thank our acquiring editor, Vince Higgs, for his support of this project. We are pleased with the excellent assistance there of Lindsay C. Barnes, Eleanor Collins, and Bethan Jones. Frances Nex has proven to be a most capable copy editor.

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Attendees photographed during the meeting in Prague. (Photo by Robert L. Hurt, Spitzer Science Center, Caltech.)