

To go to *The Science Education Review* Home Page, please click here.

The Science Education Review

Table of Contents

Volume 8, Issues 1-3, 2009

Did you Know?

Science “Happened” Only Once, 1
Learning From the Bibliographies of Scientists, 35
Newton’s Remark, 79

Articles

Papier-Mâché Animals: An Integrating Theme for Elementary Classrooms – *Emilio Duran, Lena Ballone Duran, & Eric A. Worch*, 19
Dr Skateboard’s Action Science: Teaching Physics in Context – *William H. Robertson*, 30
Incorporating Informal Learning Environments and Local Fossil Specimens in Earth Science Classrooms: A Recipe for Success – *Renee M. Clary & James H. Wandersee*, 47
Science Poetry in Two Voices: Poetry and the Nature of Science – *Wendy M. Frazier & Kristen B. Murray*, 58
Teachers’ Instructional Decision-Making: Is it Gender-Biased? – *Martha M. Voyles, Tim Fossum, & Susan Haller*, 94
Professional Development of Science Teachers: History of Reform and Contributions of the STS-Based Iowa Chautauqua Program, *Pradeep M. Dass & Robert E. Yager*, 99
Exploring Scaling: From Concept to Applications – *Marina Milner-Bolotin*, 112

Teaching Ideas

Science Story: Mesmerism and Magnetism, 1
The Internet-Telephone Interview, 2
Colourful Aprons, 2
Energizers, 3
Appreciating Deep Time, 4
Shaking a Can of Soft Drink, 5
Questioning Students, 35
Science Story: Vaseline, 79

Science Poetry

Famous Scientists, 6
Blossoms of Life, 36
Rainforests, 36
Tsunami, 80

Ideas in Brief

Teaching the Big Ideas, 37
A Pedagogy for Using Classroom Response Technology, 81

Research in Brief

Context-Based and STS Approaches, 7

Student Response Technology, 8

Solving Contextual Physics Problems, 9

Audience Response Systems in Secondary Science, 82

The Affective Value of Practical Work, 83

Inquiry-Based Learning: Questions Posed and Left Unanswered – *John T. Almarode & Robert H. Tai*, 83

Reader's Forum

Use of the Terms *Proof* and *Truth* in Science – *Peter Eastwell*, 10

The Central Dogma of Professional Development – *Emilio Duran*, 10

Prayer Study – *Peter Eastwell/Kathy Gallucci*, 14

Prayer Study (Continued) – *Peter Eastwell*, 38

Clarifying Hypothesis Testing – *Peter Eastwell*, 39

The Null Hypothesis: Good for Maths but not for Science – *Peter Eastwell*, 43

The Role of Hypotheses and Predictions in Scientific Inquiry – *Anton E. Lawson*, 43

What is a Theory? – *Peter Eastwell*, 85

A Teacher's Guide to Facilitating Conceptual Change – *Jacob Burgoon & Emilio Dura*, 87

Your Questions Answered

Molecular Collisions, 90

Laboratory Safety Guidelines

#8 of 40. Conduct periodic, unannounced laboratory inspections to identify and correct hazardous conditions and unsafe practices. Involve students and employees in simulated OSHA inspections, 15

#9 of 40. Make learning how to be safe an integral and important part of education, your work, and your play, 45

#10 of 40. Schedule regular departmental safety meetings for students and staff to discuss the results of inspections and aspects of laboratory safety, 91

Further Useful Resources 16, 46, 92

* * *

The Science Education Review

Table of Contents

Volume 7, Issues 1-3, 2008

Did you Know?

The Air we Breathe, 1

Velcro, 41

Strongest Fibre, 73

Articles

- The Periodic Table as a Tool for Teaching the Nature of Science – *Erin Peters & Donna Sterling*, 1
- The Importance of Pupils' Interests and Out-of School Experiences in Planning Biology lessons – *Anna Utto, Kalle Juuti, Jari Lavonen, & Veijo Meisalo*, 23
- Me and My Body (MAMBO): An Interactive Science Education Programme for Primary Schools – *Clare Scalzo, Fiona Killard, Aoife MacCormac, James Fryar, Emma O'Brien, & Richard O'Kennedy*, 41
- Genomics Analogy Model for Educators (GAME): Fuzzy DNA Model to Enable the Learning of Gene Sequencing by Visually-Impaired and Blind Students – *Charles Butler, Julia Bello, Alan York, Kathryn Orvis, & Barry R. Pittendrigh*, 51
- The Effects of Different Molecular Models on High School Students' Conceptions of Molecular Genetics – *Yosi Rotbain, Ruth Stavv, & Gili Marbach-Ad*, 59
- Outdoors Environmental Education for the Service of Peace: Lessons From a 2-Year Youth Program for Reconciliation in Cyprus – *Costas Kadis & Lucy Avraamidou*, 64
- The Use of Science Kits in the Professional Development of Rural Elementary School Teachers – *Ann Sherman & A. Leo MacDonald*, 91
- What are Null Hypotheses? The Reasoning Linking Scientific and Statistical Hypothesis Testing – *Anton E. Lawson*, 106

Teaching Ideas

- A Small-Scale Bed of Nails, 8
- Bad Science, 8
- Reading Questions, 9
- A Rationale for Mnemonics – *Bill Metz*, 9
- Two Equations of Life – *Mehmet Karakas*, 10
- Resistance to Reformed Teaching, 48
- Ball's Up, 73
- Conservation of Mass, 74
- Students' Alternative Conceptions: Ultraviolet Radiation and Skin Protection, 74

Critical Incident

- So Where is Your Homework? – *Erica Brownstein*, 13
- Advancement via Individual Determination – *Marsha Johnson*, 49

Science Poetry

- Water, 14
- The Digestive System, 14
- Untitled, 51
- The Heart, 76

Students' Alternative Conceptions

- Global Warming and Ozone Depletion, 15
- Animals – *Pavol Prokop*, 52

Ideas in Brief

- Context-Based Science Courses, 16
- The False Ideal of Open Inquiry, 54
- Myths Associated With Brain-Based Research, 77

Research in Brief

Take a Text or a Sheet to a Physics Exam? 16

School Size and Adoption of Technology, 17

Effect of Answer Order on Multiple-Choice Questions, 17

Effects of Context-Based and STS Approaches, 18

Gender-Related Aspects of Students' Science Questions in Online Free-Choice Environments –
Ayelet Baram-Tsabari & Anat Yarden, 18

Implementing Peer Instruction in Pre-University Courses: Clickers in Classrooms? – *Nathaniel
Lasry*, 21

How College Students in Lebanon Perceive the Theory of Evolution – *Hayat Hokayem & Saouma
BouJaoude*, 55

Museum Class Visits: Structuring the Experience – *Yael Bamberger*, 78

Creationism is Alive and Well in American High School Biology Classrooms – *Randy Moore*, 79

Scientific Inquiry as Experienced by New Zealand Students: Two Case Studies - *Anne Hume and
Richard Coll*, 80

Reader's Forum

Inquiry (Continued) – *Robert E. Yager/Peter Eastwell*, 27

Inquiry (Continued) – *Harry Keller*, 71

Inquiry Learning: Elements of Confusion and Frustration – *Peter Eastwell*, 83

Your Questions Answered

Bunsen Burner Danger, 36

Newton's Laws of Motion, 86

Laboratory Safety Guidelines

#5 of 40. Involve Every Staff Member in Some Aspect of the Safety Program and Give Each
Specific Responsibilities, 38

#6 of 40. Provide Incentives to Students and Staff for Safety Performance, 71

#7 of 40. Require all staff members to read the appropriate safety manual. Require students to
read the institution's laboratory safety rules. Have both groups sign a rules agreement. Keep
these statements on file in the department office, 89

Further Useful Resources 39, 72, 90

* * *

The Science Education Review

Table of Contents

Volume 6, Issues 1-4, 2007

Did you Know?

Fish Likely Feel Pain, 1

Restarting a Heart, 43

Nuclear Radiation Surrounds Us, 85
Detecting Mobile Phone Signals, 117

Science Story

The Mirror Galvanometer, 43
Did Thomas Edison Invent the Light Bulb? 85
First use of Radioactivity, 117

Articles

Bernoulli? Perhaps, but What About Viscosity? – *Peter Eastwell*, 1
Imaginative Thinking and the Learning of Science – *Yannis Hadzigeorgiou & Nick Fotinos*, 15
Group Work in a Classroom: An Analogy With Organisms in a Community – *Andrej Šorgo*, 28
The Use of History of Science Texts in Teaching Science: Two Cases of an Innovative,
Constructivist Approach – *Dimitris Koliopoulos, Sotiris Dossis, & Efthymios Stamoulis*, 44
Travelling the Road Beyond the Curriculum Through a Science Fair – *Lucy Avraamidou & Maria
Evagorou*, 60
Oscillating Reactions – *Vladimir M. Petruševski, Marina I. Stojanovska, & Bojan T. Šoptrajanov*,
68
Making Science Lessons Engaging, More Popular, and Equitable Through Emotional Literacy –
Brian Matthews & Emma Snowden, 86
A Novel Approach to Understanding the Process of Scientific Inquiry – *Mark Anders*, 118
Genomics Analogy Model for Educators (GAME): VELCRO® Analogy Model to Enable the
Learning of DNA Arrays for Visually-Impaired and Blind Students – *Julia Bello, Charles
Butler, Rosanne Radavich, Alan York, Christian Oseto, Kathryn Orvis, & Barry R. Pittendrigh*,
123
Hands-On Science: Does it Matter What Students' Hands are on? – *Lara M. Triona & David
Klahr*, 126
Students' Ideas About Changes in Mass Associated With Melting – *Filiz Kabapinar*, 132

Demonstration

Centripetal Force and the Bowling Ball – *Michael Sobel*, 13
Liquid Nitrogen Explosion, 56
Understanding Dynamic Equilibrium – *Pat Waller*, 87

Critical Incident

Measuring Pi – *Vladimir D. Yegorenkov*, 23
Running Lane – *Vladimir D. Yegorenkov*, 87
So Where is Your Homework? – *Erica M. Brownstein*, 121

Science Poetry

My Science, 24
Science Saves Lives, 24
Ode to Bacteria, 57
Immunisations, 58
Amoeba, 88
Development of Humans Rap, 88
Way Back When, 122
Hurricane, 122

Students' Alternative Conceptions

Microorganisms, 25
Reflection of Light, 58
Animal or Not? 89
Melting, 124

Teaching Techniques

The Raft Technique, 27
Alternating Think-Pair-Share Review, 59
Bell Work Tasks, 59
Cell Phone Cameras, 90
Using Random Numbers to Form Student Groups, 90
Formative Assessment Techniques, 90
Podcasting, 125

Ideas in Brief

Towards a Theoretical Framework for Teaching Controversial Socio-Scientific Issues – *Ralph Levinson*, 32
Open Days Portray a False Image, 64
The Myth of Teaching to Learning Styles, 65
Field Investigations are not to be Forgotten, 91
A T-Test can Make a Science Project, 91
Blogs, 130

Research in Brief

What Does Out-of-School Learning Offer School Science? – *Martin Braund & Michael Reiss*, 35
Teachers' Emphasis on Evolution in Biology, 65
Multiple Intelligences and Science Learning – *Pınar Özdemir, Sibel Güneysu, & Ceren Tekkaya*, 66
The Views of Clergy on Science and Religion, 93
Views of Science Graduates Working Outside Their Discipline Specialisation – *Susan Rodrigues*, 131

Reader's Forum

Vacuum Cleaner Advertisement, 38
The Investigation Question: The Key to Successful Inquiry-Based Science – *Kirsten Schlüter & Mark Walker*, 73
More on Inquiry – *Peter Eastwell*, 139

Your Questions Answered

Top Research Need, 38
Teaching to Learning Styles, 74
Inquiry, 94
Life Outside Teaching, 143

Laboratory Safety Guidelines

#1 of 40. Have a Written Safety Policy, 40
#2 of 40. Organise a Safety Committee, 83
#3 of 40. Develop a Safety Orientation Program, 114

#4 of 40. Encourage Caring About One's Health and Safety, 147

Further Useful Resources 41, 83, 115, 147

* * *

The Science Education Review

Table of Contents

Volume 5, Issues 1-4, 2006

Did you Know?

Oil and Water do Mix, 1

Atmospheric Carbon Dioxide, 37

Mole Day, 71

Annoying Mobile Phone users, 111

Articles

Rethinking Unsupervised Summative Assessment – *Peter Eastwell*, 1

Learning from History: A Lesson on the Model of the Earth – *Shu-Chiu Liu*, 6

What Uncouples Students' Goals From Students' Outcomes in Introductory Biology Courses? –
Randy Moore, 16

Connecting Inquiry and the Nature of Science – *Erin Peters*, 37

Reassessing Possible Naturalized Ideology Regarding Science, Education, and Religion – *Todd
Campbell*, 44

A Writing Template for Probing Students' Geological Sense of Place – *Renee Clary & Jim
Wandersee*, 51

Levels of Enquiry – *Peter Eastwell*, 61

Co-teaching as an Approach to Enhance Science Learning and Teaching in Primary Schools –
Colette Murphy & Jim Beggs, 63

Communication for Inquiry and Access: Teaching Techniques From Discourse Research – *Susan
Staats, Irene Duranczyk, Randy Moore, Jay Hatch, Murray Jensen, & Charles Somdahl*, 71

Results of a 16-Year Study of Cheating in Introductory Science Classes – *Randy Moore &
Murray Jensen*, 83

The Future of Student Grouping Systems in Science 14-16 – *Stephen Rowcliffe*, 87

The Magic Liquid: A Science Story About Acids and Bases – *Muhamad Hugerat*, 111

The "Magical" Sphere: Uncovering the Secret – *Vladimir M. Petruševski & Miha Bukleski*, 114

To What Extent can Concept Mapping Motivate Students to Take a More Meaningful Approach
to Learning Biology? – *James D. Trifone*, 122

Influencing College Chemistry Success Through High School Chemistry Teaching – *Robert H.
Tai, Philip M. Sadler, & John F. Loehr*, 123

Demonstration

Identify the Number, 4

The World's Simplest Generator? 80

Student Activity

Collisions, 5
Crystal Ball Power, 81

Critical Incident

Investigating With Models – *Bill MacIntyre*, 13
Alternative Conceptions – *Sue Cavell*, 50
Writing Prompts in the Classroom: Magic for Learning Science – *Israel Kibirige*, 81
A Critical Incident Leads to Classroom Success With “Homebrew” Radio Kits – *Kevin C. Wise*,
118

Science Poetry

My Huntsman Spider, 15
The Mystery of Stars, 15
Asteroids, 51
Poem, 51
Rainforests, 84
Mr Thorpe, 84
Nanotechnology, 121
Ode to Nuclear Fusion, 121

Students’ Alternative Conceptions

Our Natural World, 59
Fossil Fuels - *Audrey Rule*, 85
Cloning, 127

Teaching Techniques

Snakes and Ladders – *Sunitha Pillai*, 16
Engaging all Students in Cooperative Learning – *Lynne Houtz*, 18
The Formula Triangle – *Delma Clifton*, 59
Think Alouds, 86
Less-Than-Ideal Procedure – *Peter Eastwell*, 86
Talking Cards, 128

Ideas in Brief

Futures Studies and Science Education – *David Lloyd & John Wallace*, 20
The Google Calculator, 94
How Wide and Deep are our Genetic Roots? 95
Accepting Technology, Rejecting Responsibility, 95
Teaching to Learning Styles: A Myth, 128
Using Concept-Mapping to Enhance PowerPoint Presentations, 129

Research in Brief

Overcoming the Challenge of Teaching Open Inquiry – *Michal Zion & Esther Shedletzky*, 22
Teachers’ Understanding of the Nature and Purpose of Practical Work – *Esin Sahin Pekmez*,
Philip Johnson, & *Richard Gott*, 24
Investigating Nature While Going to School, 96
An STS and Textbook Approach Compared, 97
Cognitive Conflict Versus Direct Teaching, 97

Reader's Forum

- Admit You Don't Know- *Eric Sensiba*, 28
- Beliefs About Questioning - *Tertia Hogan*, 29
- The Burning Candle Question - *Mojca Cepic*, 30
- Depth Versus Breadth - *Esther Zirbel*, 63
- Draw-A-Scientist Test - *Peter Eastwell*, 97
- The "Mobius" Effect - *Louis Rosenblatt*, 99

Your Questions Answered

- Mistakes, 31
- Cooperative Learning Techniques, 32
- Stocking Materials, 33
- Maintaining Materials, 33
- Classroom Rules, 34
- Motivation, Passion, and Love, 65
- National Curriculum, 102
- Socioscientific Issues, 104
- Displays, 130

Further Useful Resources 36, 69, 110, 131

* * *

The Science Education Review

Table of Contents

Volume 4, Issues 1-4, 2005

Did you Know?

- A reply to "but the answer is right," when the working shows no merit, 1
- The World's Most Deadly Poison, 39
- Geological Timeline, 67
- Falling Bullets, 95

Science Stories

- Nuclear Testing and Baby Teeth, 1
- A Noble Experiment – *Stephen Rowcliffe*, 39
- The Great Hartford Circus Fire, 67
- The Discovery of Artificial Sweeteners: Good Luck and Bad Science? – *Stephen Rowcliffe*, 95

Articles

- Making Real Virtual Labs – *Harry Keller & Edward Keller*, 2
- Scanner Art and Links to Physics – *David Russell*, 21
- Design-Based Science – *David Fortus*, 40

- "P.S. - I'm white too": The Legacy of Evolution, Creationism, and Racism in the United States –
Randy Moore & Carl Chung, 50
- World First MarsLink Mission Participants Learn and Enjoy Science – *Dana Barry*, 68
- Do Children Have Similar Models of Understanding for Seeing, Hearing, and Smelling? –
Anthony Cuthbert, 72
- Informal Science Education for Girls: Careers in Science and Effective Program Elements –
Kathleen Fadigan & Penny Hammrich, 83
- Learning From our Students: Photovoice and Classroom Action Research – *Dean Whitfield &*
Helen Meyer, 97
- Trouble in the Kitchen: A Problem-Based Activity in Human Biology – *Christopher Clovis*, 106
- Transforming Your Practice: Hero or Heretic – *Gary Simpson*, 111
- Reflections from a Computer Simulations Program on Cell Division in Selected Kenyan
 Secondary Schools – *Mwangi Ndirangu, Joel K. Kiboss, & Duncan W. Wekesa*, 117
- The Splashdown Effect: Measuring the Effect of Science Enrichment Programs on Science
 Attitudes of Gifted High School Girls and Boys – *Jayne E. Stake & Kenneth R. Mares*, 120

Demonstration

- Land Covering the Earth's Surface, 11
- The Edible Candle – *Lynne Houtz*, 47
- Spread of Disease, 70
- The Returning Ball – *Joseph Ireland*, 104

Student Activity

- The World's Simplest Motor? 12
- Mining and Conserving our Earth Resources: The "Earth Cake" Activity – *Lynne Houtz*, 48
- Exploring Animals, 71
- Seeing Blood Cells, 105

Critical Incident

- On Your Own – *Gary Simpson*, 12
- On Two Dark Rocks – *Louis Rosenblatt*, 51
- Touching the Learner, Just-In-Time – *Israel Kibirige*, 73
- The History of Understanding – *Vladimir Yegorenkov*, 109

Science Poetry

- Plastic Bags, 15
- The Perfect Job, 16
- Science is . . . ?, 53
- The Brain Train, 54
- The Study of Science, 74
- Just Like You!!!, 75
- Erupting, 110
- That's Science, 110

Students' Alternative Conceptions 17, 55

- Three Senses – *Anthony Cuthbert*, 75
- Weight of a Candle, 116

Teaching Techniques

Write to Grandma, 19
Science Autobiography, 19
Display of Student Artifacts, 20
Model Analysis of Lab Reports, 20
To Your Corner, 55
Probable Passage, 78
Say Something, 79
Literature Circle, 79
Students' Questions, 116

Ideas in Brief

Computer Projectors, 26
Inquiry Classroom Management Checklist, 27
Interview Assessment, 56
Using Projects to Stimulate Learning, 56
Tab Posters, 79
Service Learning, 80
Habits of Mind, Scholarship, and Decision-Making in Science and Religion – *Colin Gauld*, 118

Research in Brief

Use of Anthropomorphism and Animism in Science Instruction: What do Early Years Teachers Think About it? – *Maria Kellery-Vlahos*, 29
Experiences and Outcomes of Graduate Courses for Elementary and Middle School Teachers Studied On-Line and On-Campus – *Wynne Harlen*, 31
Using Science Fiction Stories to Assess Students' Ideas About the Nature of Science – *Pedro Reiss*, 57
Secondary Science Teachers' Use of Inquiry Science Teaching – *Nam-Hwa Kang*, 80
An Instruction-Preference Interaction in Different Delivery Models of Computer-Assisted Instruction – *Chun-Yen Chang*, 119

Reader's Forum

Cartooning to Engage Students – *Vidya Hajirnis*, 58
Recreating Cuthbert's Experiment – *Gary Simpson*, 90
Inquiry Learning – *Kevin Scully*, 125

Your Questions Answered

Evolution and Species, 32
Getting Students' Attention, 33
Getting Students' Attention (cont.), 59
Evolution and the Origin of Life, 61
Group Roles, 91
Electric Fence Shock, 92
Heat Energy Changes Associated With Dissolving, 93
Individual Student Accountability, 126
Zap From a Car, 127

Further Useful Resources 37, 65, 93, 127

* * *

The Science Education Review

Table of Contents

Volume 3, Issues 1-4, 2004

Did you Know?

Cave people and dinosaurs, 1

Walt Disney's body, 47

Functional magnetic resonance imaging (MRI) and science education research, 83

Intelligence in the heart, 111

Science Stories

Murphy's Law, 1

The Dr Fox Lecture, 47

Franklin's Kite Experiment: Fact or Hoax? 84

Flatus: Beware! 111

Articles

Going Beyond STS: Towards a Curriculum for Sociopolitical Action – *Derek Hodson*, 2

Critical Constructivism, Neo-Relativism, and the Place of Values in Science Education – *Gary Simpson*, 23

How Jeff Gordon and NASCAR Helped to Develop a High School Science Curriculum and Educate Future Teachers – *Ronald Hoodak*, 32

The 5E Instructional Model: A Learning Cycle Approach for Inquiry-Based Science Teaching – *Lena Ballone Duran & Emilio Duran*, 49

Practising Active Science With Child Refugees: A Clinical Perspective – *Frédéric Perrier*, 67

Finding Meaning and Value in Science – *Richard Kozoll & Margery Osborne*, 72

Assessing Learning in a Student-Centred Classroom Environment – *Gary Simpson*, 85

Turning Around Newton's Second Law – *John Eric Goff*, 97

In Their own Words: What Girls say About Their Science Education Experiences – *Michael Papadimitriou*, 112

Processing Pictures from Digital Cameras – *Denis Burchill*, 124

Demonstrations

Using the Paranormal to Teach Scientific Habits of Mind – *Michael J. Dougherty*, 8

Modelling Sound With Students, 59

Pick the Sweet Liquid, 85

Balloon in the Flask, 112

Student Experiments

Murphy's Laws, 11

An Alka-Seltzer Rocket, 60

The Burning Candle Question, 86

The Dissolving Money, 114

Critical Incident

- "Miss, may I Please Explain to you About Radioactive Isotopes?" – *Gary Simpson*, 13
- Communication – *Gary Simpson*, 60
- Setting the Boundaries – *Gary Simpson*, 88
- When Teachers Give up on Students – *Gary Simpson*, 115

Science Poetry

- Science, 16
- Theories of Matter, 16
- I Want to be a Scientist, 63
- "It's Change ...," 63
- Earth's Poem, 91
- Poetry and Science, 119
- The Enlightening Periodic Table, 120

Students' Alternative Conceptions 18, 64, 94, 121

Teaching Techniques

- Press Conference, 19
- Element Bingo, 20
- Two-Part Chits – *Vidya Hajirnis*, 65
- Devising Mnemonics, 66
- Jigsaw – *Patrick Croner*, 96
- More Mnemonics – *Jade Gopie, Paul Beier, Grant Eyles, & Bruno Testa*, 97
- The *Class Points* Game, 122
- Show of Fingers, 123
- National Flag and Anthem, 123
- More Mnemonics, 123

Ideas in Brief

- Questions to Avoid Asking, 20
- PBL Need not be Difficult, 21
- The Narrative Lab Report, 68
- Teaching Controversial Issues: An Improved Approach, 68
- Whiteboarding, 102
- Poster Sessions Using Powerpoint, 103
- A Fair Classroom Setting, 129

Research in Brief

- The Activity Model for Scientific Inquiry, 29
- Using Drug-Related Topics to Teach Biology and Chemistry, 30
- Effect of Inquiry Learning on Physical Science Standardized Scores, 31
- Incorporating Problem-Based Learning in Biology Project Work – *Christine Chin*, 77
- Factors Affecting the Teaching of Evolution, 104
- Using Constructivist Environments to Change Students' Enjoyment of Science Lessons, 130

Your Questions Answered

- How is the molecular structure of substances identified? 37
- How long is a DNA strand? 37

What is the difference between inquiry learning and discovery learning? 38
What things should I consider if I am trying to meet the individual learning needs of so many different children in class? 39
What benefits might I gain by maintaining a website, and what suggestions do you have for someone about to try it? 79
Do all animals have hearts? 80
Why don't birds get hit by lightning? 106
How can one assess a guided discovery lesson? 107
I recently placed a bottle of softdrink in the freezer . . . ? 132
Why do stars twinkle, yet planets do not? 134
What changes might be made to teacher education programs to better prepare teachers for the science classroom? 134
Is it still appropriate to teach students in year levels, or should we set classes up in a vertical way? 136

Further Useful Resources 42, 81, 109, 137

Quotes 48

Humour 45, 82

* * *

The Science Education Review

Table of Contents

Volume 2, Issues 1-4, 2003

Did you Know?

Availability of fresh, clean water, 1
Oxygen added to the atmosphere, 37
How air fresheners work, 65
Origin of "mad as a hatter," 103

Science Stories

The "First" Artificial Diamond, 1
Eugenics in the United States, 37
Nazi Atrocities, 65
Shape of the Earth, 103

Articles

Curriculum Reform in Science: Getting Started – *Audrey Sewell*, 2
Evolution, Creationism, and the Courts: 20 Questions – *Randy Moore & Karen L. Miksch*, 15
Students Enjoy Chemical Sensation – *Dana Barry & Hideyuki Kanematsu*, 38
Developing Critical Thinking Skills Through the Use of Guided Laboratories – *Patrick Croner*, 46

Cardiac Baseball: A Questioning Game – *James Hannon*, 48
Ecology at Work: The Biodome Challenge – *Christopher Clovis*, 55
Using WebQuests to Successfully Engage Students in Learning Science – *Gary Simpson*, 66
The Problems With State Educational Standards – *Randy Moore, Murray Jensen, & Jay Hatch*, 83
Strategies for Teaching Science Content Reading – *Patrick E. Croner*, 104
Pasta Power – *Lena B. Duran*, 121
United Nations Illiteracy in America: Thoughts on Integrating the United Nations Into the Science Curriculum – *John Klock*, 137

Demonstrations

Water for Human Consumption, 12
The Frustrating Tear, 2
The Rocket Principle, 42
Teaching General Chemistry Concepts, to Blind and Visually Impaired Students, Through Hands-On Demonstrations Inclusive of Sighted Students – *Ted Lennox & Mark Benvenuto*, 74
Drop the Matchbox, 119

Student Experiments

Delicious Weathering, 13
Why Does a Breeze Feel Cool? 14
Count a Million!! – *Graeme Abbott*, 44
Learning and Having Fun With Electric Letter Soups – *Wilson J. Gonzalez-Espada*, 79
Expansion of Air, 120

Science Poetry

Describing Antarctica, 16
The Circulatory System, 17
Oxygen, 46
Cells, 47
Scientific Evolution, 84
Fossils, 85
Science, 130
Natural Disaster, 131

Students' Alternative Conceptions 17, 47, 85, 131

Teaching Techniques

1:4:P:C:R, 20
Student Mobility, 21
Paired Interview, 50
Tactile Tools in the Classroom – *Margaret Underwood*, 51
Decision-Making Matrix, 86
Sound in the Science Lab – *Margaret Underwood*, 88
Periodic Grouping, 132
Your Turn, 133
Task Cards: A Tactile Resource – *Margaret Underwood*, 133

Ideas in Brief

Plagiarism: Prevention and Detection, 22

Cultivate Interest Early, 23
Science Teachers and Terrorism, 24
Adding Interest to the Physics Classroom, 24
Misconduct in Science, 25
Science and Religion: Is Conflict Necessary? 52
Using Anchor Activities, 53
Students Monitor Their Writing, 54
Designing a Rubric, 90
Desirable Science Teacher Characteristics, 92
The 7E Learning Model, 134
Modifying Labs for Inquiry I, 135
Modifying Labs for Inquiry II, 136

Research in Brief

Resistance to New Ideas by Students and Scientists: Any Parallels? 26
Understanding in Primary Science, 29
How Effective is Problem-Solving in Developing Physics Concepts? 30
Longer-Term Impact of an Inquiry-Based Program on Attitudes Toward Science, 30
Problem-Based Learning: Features and Barriers, 31
A Review of Middle School Programs, 55
Better History of Science Needed, 56
Success Using Embedded Assessment, 57
What do Preservice Teachers Learn From Their own Education Experiences? 93
Teachers' Use of Students' Prior Understanding, 137
Conceptual Change Need Not be Difficult, 138

Readers' Forum

Science and Religion – *Harry Keller*, 95

Your Questions Answered

If the pull of the moon causes a high tide, and we rotate past the moon once daily, why don't we experience just one high tide each day? 33
Evolution is an example of historical science, as opposed to experimental science. However, I recall hearing something about evolution being demonstrated with microorganisms in the laboratory. Has evolution really been observed experimentally, or is it just one or more components of the theory that have been demonstrated in the laboratory? 59
Is science education culture free? 95
Why does our hair turn grey? 99
Unlike most materials, a stretched rubber band contracts when heated. Why? 139
Is it necessary to include history of science in the development of the curriculum? If so, Why? 140

Further Useful Resources 34, 60, 99, 144

Quotes 32, 54, 78, 90, 119

Humour 35, 62, 101, 146

* * *

The Science Education Review

Table of Contents

Volume 1, Issues 1-4, 2002

Did you Know?

Salt in the oceans, 1
Length of hair on a person's head, 41
Food hygiene, 81
Gold in seawater, 121

Science Stories

Lord Kelvin, 42
Why Sb for Antimony? 42
Beethoven's Ailment, 81
Skin Colour Change, 121

Articles

Scientific Literacy – *Peter Eastwell*, 1
Self-Assessment: A Powerful Tool – *Peter Eastwell*, 7
Catering for Individual Student Needs – *Peter Eastwell*, 14
High School Physics: What Help to College Physics? 22
Assessment Task: Choice in Assignments, 28
The Changing Nature of Science Teacher Education: An Interview With Keith Lucas, 32
The Nature of Science – *Peter Eastwell*, 43
Poetry: Adding Passion to the Science Curriculum – *Peter Eastwell*, 52
Catering for Individual Student Needs: Learning Styles (Part 1) – *Margaret Underwood*, 58
Introducing Cooperative Learning: Using a Quiz, 72
Social Constructivism – *Peter Eastwell*, 82
Catering for Individual Student Needs: Learning Styles (Part 2) – *Margaret Underwood*, 92
Using Primers to Motivate Your Students – *Dan Graff*, 121
Teaching Concepts and Developing Reasoning Skills Using Learning Cycles – *Anton Lawson*, 133
Does Music Sooth the Savage Beast? A Pedagogical Attempt to Cross the Cultural Divide – *Philip Sargeant & Gary Simpson*, 135
Traveling Through the Curriculum: A Method of Holistic Teaching – *Heather McArdle*, 139
Using Enrichment and Extracurricular Activities to Influence Secondary Students' Interest and Participation in Science – *Peter Eastwell & Léonie Rennie*, 149

Demonstrations

Look Mum, no Glue! 4
The Disobedient Foot, 4
Invisible Glue, 48
Tie Water Streams Together, 49
What do you See? 86
The Magic Candle, 86

The Falling Cards, 126
Odd Bottle Behaviour, 127

Student Experiments

One Bad Apple, 6
The Mysteriously Rising Water, 7
Science in a Bag, 50
Upset Stomach, 52
Shattering Rocks, 87
Reaction Time, 89
Wrinkled Skin, 127
Make a Rock, 128

Science Poetry

Science has the Answers, 90
Inventors, 91
Ants, 129
Science Teachers Take Themselves too Seriously, 130

Students' Alternative Conceptions 9, 57, 99, 131

Research Project: An Invitation to You 13

Teaching Techniques

Postbox, 16
Forming Student Groups, 17
Think: Pair: Share, 17
Science Soccer, 17
Round Robin, 65
Hot Potato, 65
Dirty Tricks, 66
The Issue Bin, 100
PCQ, 101
The Signature Game, 133
The KWL Chart, 134

Ideas in Brief

Modelling: An Underused Strategy, 18
Chemistry for Scientific Literacy, 19
Knowing Your Students, 19
Why use Cooperative Learning? 20
Out With the Traditional Lecture, 20
Questioning Techniques, 21
Why Teach Biology Backwards, 21
PLTL: A New Teaching Model, 66
Testing, and More Testing, 68
Great Lessons, 68
Using a Timeline, 69
Democracy in the Science Classroom, 69

Science Education Needs to be Modernised, 71
Pressure to Teach the Test, 71
Senior Citizens in the Classroom, 101
Benefits From Reviewing Peers, 102
Mentoring and Career Development, 102
Current Events Journal, 103
The Term *Theory* Misrepresented, 104
Relevant Science for Scientific Literacy, 104
Group Web Page Projects, 106
Some Testing and Assessment Issues, 107
A Photography Club, 108
Teaching Students to Summarise, 109
Science Homework, 110
Individual Variation Brings Science Alive, 111
Interdisciplinarity in Science Education, 135
Science and World Citizenship, 137
Controversial Issues in the Curriculum, 138

Research in Brief

Teaching Diffusion and Osmosis, 24
Peer Tutoring in Primary Science, 25
Research and the Teacher, 25
Effectiveness of Role-Play and Debate, 26
Computer Dissections, 26
Newspapers in the Classroom, 26
How Much Cheating in Science Fairs, 27
Implementing School-Based Assessment, 74
Deeper Learning, 75
Evidence Used by the Public, 75
Which Information Should I Trust? 76
More Depth, Less Topic Coverage, 76
Students' Conceptions of Invention, 113
The Role of Models in Science, 114
More Active Learning During Lectures, 115
How Sceptical are our Students? 116
What Science Education do Students Need? 146
How do Students of Project-Based Science Courses Perform on Standardised Tests? 147

Your Questions Answered

Would a magnet exist in outer space? 30
What is the difference between an atom and a molecule? 30
Why can't Cling Wrap break down? 30
Why can't a virus be treated with antibiotics? 31
Why do cold substances, like dry ice, burn the skin? 31
How was ice made in the days of only ice boxes? 31
Is water a satisfactory fire extinguisher for the kitchen? 77
Is it true that you get wetter running in the rain than walking? 77
How does lead from petrol stay in the atmosphere long enough for us to breathe it in? We know lead is toxic, so why was it added to petrol in the first place? Has it been replaced with something else? 118

How can I explain photosynthesis to my middle school students? 150

Further Useful Resources 37, 79, 119, 154

Quotes 5, 15, 132

Humour 39, 80, 120, 156

* * *