Stanford

Jonathan Osborne

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CONTACT INFORMATION

- **Admin. Support**

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Bio

BIO

My research focus is a mix of work on policy and pedagogy in the teaching and learning of science. In the policy domain, I am interested in exploring students' attitudes to science and how school science can be made more worthwhile and engaging - particularly for those who will not continue with the study of science. In pedagogy, my focus has been on making the case for the role of argumentation in science education both as a means of improving the use of a more dialogic approach to teaching science and improving student understanding of the nature of scientific inquiry. I have worked on four major projects in argumentation. The first from 1999-2002 was on 'Enhancing the Quality of Argument in School Science Education'. From this we developed the IDEAS (Ideas, Evidence and Argument in Science Education) materials to support teacher professional learning funded by the Nuffield Foundation. From 2007-2010 I was co-PI on the project 'Learning to Teach Ideas, Evidence and Argument in School Science' which explored how to build teachers competency with the use of this pedagogy in four schools. Most recently, I have worked with Mark Wilson of UCB on a project to develop and test a learning progression for Argumentation in science. Some of this work can be found on the website:

http://scientificargumentation.stanford.edu/

My other area of interest in pedagogy is the teaching of reading and the facilitation of discussion. I have published a book entitled 'Language and Literacy in Science Education' and we are just completing a five year IES funded project - 'Catalyzing Comprehension through Discussion and Debate' exploring how we can support the teaching of reading in science. We have developed a web site with some of our materials:

http://serpmedia.org/rtl/

And a MOOC called 'Reading to Learn in Science" which is offered by NovoEd and will be run again from Jan 13, 2016 for 12 weeks.

Finally, much science, if not more, is learned outside the classroom and how young people learn in that environment and what it has to offer formal education is another focus of my work and I was one of the partners in the NSF funded Centre for Informal Learning and Schools (2002-7) and have several publications in this field.

ACADEMIC APPOINTMENTS

- Professor Emeritus-Hourly, Graduate School of Education

ADMINISTRATIVE APPOINTMENTS

- Professor, Stanford Graduate School of Education, (2009- present)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Chair, OECD PISA Science Expert Group (2018 - present)
- Head of Department of Education and Professional Studies, King's College London (2005 - 2008)
- Chair of Science Education, King's College London (2003 - 2008)
- Professor of Science Education, King's College London (2000 - 2003)
- Senior Lecturer in Science Education, King's College London (1996 - 2000)
- Lecturer in Science Education, King's College London (1985 - 1996)
- Advisory Teacher, Inner London Schools (1982 - 1985)
- Physics and Science Teacher, High schools (1973 - 1981)

PROFESSIONAL EDUCATION

- PhD, King's College, University of London , Education (1996)
- Masters, Queen Mary College, University of London , Astrophysics (1976)
- Post Graduate Certificate, Cambridge University , Education (1973)
- B.Sc, Bristol University , Physics (1972)

LINKS

- Reading to Learn in Science: http://serpmedia.org/rtl/
- Assessments of Argumentation in Science: http://scientificargumentation.stanford.edu/
- Stanford NGSS Assessment Project: http://snapgse.stanford.edu/

Research & Scholarship

RESEARCH INTERESTS

- Professional Development
- Science Education
- Teachers and Teaching

Publications

PUBLICATIONS

- **Using automated analysis to assess middle school students' competence with scientific argumentation** *JOURNAL OF RESEARCH IN SCIENCE TEACHING*
  Wilson, C. D., Haudek, K. C., Osborne, J. F., Buck Bracey, Z. E., Cheuk, T., Donovan, B. M., Stuhlsatz, M. M., Santiago, M. M., Zhai, X.
  2023
- **Science education in an age of misinformation** *SCIENCE EDUCATION*
  Osborne, J., Pimentel, D.
  2023
- **Science, misinformation, and the role of education.** *Science (New York, N.Y.)*
  Osborne, J., Pimentel, D.
  2022; 378 (6617): 246-248
- **TEACHER FACILITATION OF ELEMENTARY SCIENCE DISCOURSE AFTER A PROFESSIONAL DEVELOPMENT INITIATIVE** *ELEMENTARY SCHOOL JOURNAL*

Borko, H., Zaccarelli, F., Reigh, E., Osborne, J.
2021

- **How Might the Next Generation Science Standards Support Styles of Scientific Reasoning in Biology?** *AMERICAN BIOLOGY TEACHER*
  Rafanelli, S., Osborne, J.
  2020; 82 (9): 579–83

- **Dialogic approaches to supporting argumentation in the elementary science classroom** *ROUTLEDGE HANDBOOK OF LANGUAGE AND SCIENCE*
  Reigh, E., Osborne, J., Gruber, D. R., Olman, L. C.
  2020: 164–77

- **What Makes a Good Question? Towards an Epistemic Classification** *QUESTIONING CHILD: INSIGHTS FROM PSYCHOLOGY AND EDUCATION*
  Osborne, J., Reigh, E., Butler, L. P., Ronfard, S., Corriveau, K. H.
  2020: 281-300

- **Not "hands on" but "minds on": A response to Furtak and Penuel** *SCIENCE EDUCATION*
  Osborne, J. F.
  2019

- **A response to Saleh et al.: The wrong call to action** *JOURNAL OF RESEARCH IN SCIENCE TEACHING*
  Osborne, J., Rafanelli, S.
  2019; 56 (4): 529–31

- **Impacts of a Practice-Based Professional Development Program on Elementary Teachers' Facilitation of and Student Engagement With Scientific Argumentation** *AMERICAN EDUCATIONAL RESEARCH JOURNAL*
  Osborne, J. F., Borko, H., Fishman, E., Gomez Zaccarelli, F., Berson, E., Busch, K. C., Reigh, E., Tseng, A.
  2019

- **Using Computer Technology to Support the Teaching and Learning of Argumentation in Chemistry** *ARGUMENTATION IN CHEMISTRY EDUCATION: RESEARCH, POLICY AND PRACTICE*
  Henderson, J., Osborne, J. F., Erduran, S.
  2019; 2: 79–105

- **Toward a more coherent model for science education than the crosscutting concepts of the next generation science standards: The affordances of styles of reasoning** *JOURNAL OF RESEARCH IN SCIENCE TEACHING*
  Osborne, J., Rafanelli, S., Kind, P.
  2018; 55 (7): 962–81

- **Reading for meaning: The foundational knowledge every teacher of science should have** *INTERNATIONAL JOURNAL OF SCIENCE EDUCATION*
  Patterson, A., Roman, D., Friend, M., Osborne, J., Donovan, B.
  2018; 40 (3): 291–307

- **Styles of Scientific Reasoning: A Cultural Rationale for Science Education?** *SCIENCE EDUCATION*
  Kind, P., Osborne, J.
  2017; 101 (1): 8-31

- **A Practice-Based Professional Development Program to Support Scientific Argumentation From Evidence in the Elementary Classroom** *JOURNAL OF SCIENCE TEACHER EDUCATION*
  Fishman, E. J., Borko, H., Osborne, J., Gomez, F., Rafanelli, S., Reigh, E., Tseng, A., Million, S., Berson, E.
  2017; 28 (3): 222–49

- **Going Beyond the Consensus View: A Response** *CANADIAN JOURNAL OF SCIENCE MATHEMATICS AND TECHNOLOGY EDUCATION*
  Osborne, J.
  2017; 17 (1): 53-57

- **The PISA Science Assessment for 2015 and the Implications for Science Education: Uses and Abuses**
  Osborne, J., Oskarsson, M., Serder, M., Sjoberg, S., Hahl, K., Juuti, K., Lampiselka, J., Uitto, A., Lavonen, J.
  SPRINGER INTERNATIONAL PUBLISHING AG.2017: 191-203

- **The development and validation of a learning progression for argumentation in science** *JOURNAL OF RESEARCH IN SCIENCE TEACHING*
  Osborne, J. F., Henderson, J. B., MacPherson, A., Szu, E., Wild, A., Yao, S.

2016; 53 (6): 821-846

- **Factual accuracy and the cultural context of science in popular media: Perspectives of media makers, middle school students, and university students on an entertainment television program.** *Public understanding of science*
  Szu, E., Osborne, J., Patterson, A. D.
  2016
- **Science-Related Outcomes: Attitudes, Motivation, Value Beliefs, Strategies** *ASSESSING CONTEXTS OF LEARNING: AN INTERNATIONAL PERSPECTIVE*
  Schiepe-Tiska, A., Roczen, N., Mueller, K., Prenzel, M., Osborne, J., Kuger, S., Klieme, E., Jude, N., Kaplan, D.
  2016: 301–29
- **'Not girly, not sexy, not glamorous': primary school girls' and parents' constructions of science aspirations** *PEDAGOGICAL RESPONSES TO THE CHANGING POSITION OF GIRLS AND YOUNG WOMEN*
  Archer, L., DeWitt, J., Osborne, J., Dillon, J., Willis, B., Wong, B., Paechter, C., George, R., McRobbie, A.
  2016: 171-194
- **Beyond Construction: Five arguments for the role and value of critique in learning science** *INTERNATIONAL JOURNAL OF SCIENCE EDUCATION*
  Henderson, J. B., MacPherson, A., Osborne, J., Wild, A.
  2015; 37 (10): 1668-1697
- **Is Science for Us? Black Students' and Parents' Views of Science and Science Careers** *SCIENCE EDUCATION*
  Archer, L., Dewitt, J., Osborne, J.
  2015; 99 (2): 199-237
- **Bridging Science Education and Science Communication Research** *JOURNAL OF RESEARCH IN SCIENCE TEACHING*
  Baram-Tsabari, A., Osborne, J.
  2015; 52 (2): 135-144
- **Analyzing Science Education in the United Kingdom: Taking a System-Wide Approach** *SCIENCE EDUCATION*
  Falk, J. H., Dierking, L. D., Osborne, J., Wenger, M., Dawson, E., Wong, B.
  2015; 99 (1): 145-173
- **Analyzing Science Education in the United Kingdom: Taking a System#Wide Approach** *Science Education*
  Falk, J. H., Dierking, L. D., Osborne, J., Wenger, M., Dawson, E., Wong, B.
  2015; 99 (1): 145-173
- **The Science Classroom as a Site of Epistemic Talk: A Case Study of a Teacher's Attempts to Teach Science Based on Argument** *JOURNAL OF RESEARCH IN SCIENCE TEACHING*
  Christodoulou, A., Osborne, J.
  2014; 51 (10): 1275-1300
- **Revising the economic imperative for US STEM education.** *PLoS biology*
  Donovan, B. M., Moreno Mateos, D., Osborne, J. F., Bisaccio, D. J.
  2014; 12 (1)
- **Scientific Practices and Inquiry in the Science Classroom** *HANDBOOK OF RESEARCH ON SCIENCE EDUCATION, VOL II*
  Osborne, J., Lederman, N. G., Abell, S. K.
  2014: 579-599
- **Teaching Scientific Practices: Meeting the Challenge of Change** *JOURNAL OF SCIENCE TEACHER EDUCATION*
  Osborne, J.
  2014; 25 (2): 177-196
- **Scientific practices and inquiry in the science classroom** *Handbook of Research on Science Education, Volume II*
  Osborne, J.
  Routledge.2014: 593–613
- **Revising the Economic Imperative for US STEM Education.** *PLoS biology*
  Donovan, B. M., Moreno Mateos, D., Osborne, J. F., Bisaccio, D. J.
  2014; 12 (1): e1001760

- **Science-related Aspirations Across the Primary-Secondary Divide: Evidence from two surveys in England** *INTERNATIONAL JOURNAL OF SCIENCE EDUCATION*
  DeWitt, J., Archer, L., Osborne, J.
  2014; 36 (10): 1609-1629
- **Nerdy, Brainy and Normal: Children's and Parents' Constructions of Those Who Are Highly Engaged with Science** *RESEARCH IN SCIENCE EDUCATION*
  DeWitt, J., Archer, L., Osborne, J.
  2013; 43 (4): 1455-1476
- **Young Children's Aspirations in Science: The unequivocal, the uncertain and the unthinkable** *INTERNATIONAL JOURNAL OF SCIENCE EDUCATION*
  DeWitt, J., Osborne, J., Archer, L., Dillon, J., Willis, B., Wong, B.
  2013; 35 (6): 1037-1063
- **Learning to argue: A study of four schools and their attempt to develop the use of argumentation as a common instructional practice and its impact on students** *JOURNAL OF RESEARCH IN SCIENCE TEACHING*
  Osborne, J., Simon, S., Christodoulou, A., Howell-Richardson, C., Richardson, K.
  2013; 50 (3): 315-347
- **Exploring young students' collaborative argumentation within a socioscientific issue** *JOURNAL OF RESEARCH IN SCIENCE TEACHING*
  Evagorou, M., Osborne, J.
  2013; 50 (2): 209-237
- **Bourdieu's notion of cultural capital and its implications for the science curriculum** *SCIENCE EDUCATION*
  Claussen, S., Osborne, J.
  2013; 97 (1): 58-79
- **'Not girly, not sexy, not glamorous': primary school girls' and parents' constructions of science aspirations** *PEDAGOGY CULTURE AND SOCIETY*
  Archer, L., DeWitt, J., Osborne, J., Dillon, J., Willis, B., Wong, B.
  2013; 21 (1): 171-194
- **Bourdieu's notion of cultural capital and its implications for the science curriculum** *Science Education*
  Claussen, S., Osborne, J.
  2013; 97 (1): 58-79
- **Learning to argue: A study of four schools and their attempt to develop the use of argumentation as a common instructional practice and its impact on students** *Journal of Research in Science Teaching*
  Osborne, J., Simon, S., Christodoulou, A., Howell#Richardson, C., Richardson, K.
  2013; 50 (3): 315-347
- **The 21st century challenge for science education: Assessing scientific reasoning** *THINKING SKILLS AND CREATIVITY*
  Osborne, J.
  2013; 10: 265-279
- **"Balancing acts": Elementary school girls' negotiations of femininity, achievement, and science** *SCIENCE EDUCATION*
  Archer, L., Dewitt, J., Osborne, J., Dillon, J., Willis, B., Wong, B.
  2012; 96 (6): 967-989
- **Science Aspirations, Capital, and Family Habitus: How Families Shape Children's Engagement and Identification With Science** *AMERICAN EDUCATIONAL RESEARCH JOURNAL*
  Archer, L., Dewitt, J., Osborne, J., Dillon, J., Willis, B., Wong, B.
  2012; 49 (5): 881-908
- **Authors' response to "For whom is argument and explanation a necessary distinction? A response to Osborne and Patterson" by Berland and McNeill** *SCIENCE EDUCATION*
  Osborne, J., Patterson, A.
  2012; 96 (5): 814-817
- **'Should We Kill the Grey Squirrels?' A Study Exploring Students' Justifications and Decision-Making** *INTERNATIONAL JOURNAL OF SCIENCE EDUCATION*
  Evagorou, M., Pilar Jimenez-Aleixandre, M., Osborne, J.

2012; 34 (3): 401-428

- **Scientific Reasoning and Argumentation from a Bayesian Perspective** *PERSPECTIVES ON SCIENTIFIC ARGUMENTATION: THEORY, PRACTICE AND RESEARCH*
  Szu, E., Osborne, J., Khine, M. S.
  2012: 55-71

- **Perspectives on Scientific Argumentation Theory, Practice and Research Introduction** *PERSPECTIVES ON SCIENTIFIC ARGUMENTATION: THEORY, PRACTICE AND RESEARCH*
  Osborne, J., MacPherson, A., Patterson, A., Szu, E., Khine, M. S.
  2012: 3-15

- **Science aspirations, capital, and family habitus: How families shape children's engagement and identification with science** *American Educational Research Journal*
  Archer, L., DeWitt, J., Osborne, J., Dillon, J., Willis, B., Wong, B.
  2012; 49 (5): 881-908

- **Scientific Argument and Explanation: A Necessary Distinction?** *SCIENCE EDUCATION*
  Osborne, J. F., Patterson, A.
  2011; 95 (4): 627-638

- **HIGH ASPIRATIONS BUT LOW PROGRESSION: THE SCIENCE ASPIRATIONS-CAREERS PARADOX AMONGST MINORITY ETHNIC STUDENTS** *INTERNATIONAL JOURNAL OF SCIENCE AND MATHEMATICS EDUCATION*
  DeWitt, J., Archer, L., Osborne, J., Dillon, J., Willis, B., Wong, B.
  2011; 9 (2): 243-271

- **Scientific argument and explanation: A necessary distinction?** *Science Education*
  Osborne, J. F., Patterson, A.
  2011; 95 (4): 627-638

- **SCIENCE EDUCATION POLICY AND ITS RELATIONSHIP WITH RESEARCH AND PRACTICE Lessons From Europe and the United Kingdom** *ROLE OF PUBLIC POLICY IN K-12 SCIENCE EDUCATION*
  Osborne, J., DeBoer, G. E.
  2011: 13-46

- **Students' Questions and Discursive Interaction: Their Impact on Argumentation During Collaborative Group Discussions in Science** *JOURNAL OF RESEARCH IN SCIENCE TEACHING*
  Chin, C., Osborne, J.
  2010; 47 (7): 883-908

- **"Doing" Science Versus "Being" a Scientist: Examining 10/11-Year-Old Schoolchildren's Constructions of Science Through the Lens of Identity** *SCIENCE EDUCATION*
  Archer, L., Dewitt, J., Osborne, J., Dillon, J., Willis, B., Wong, B.
  2010; 94 (4): 617-639

- **Arguing to Learn in Science: The Role of Collaborative, Critical Discourse** *SCIENCE*
  Osborne, J.
  2010; 328 (5977): 463-466

- **Recollections of Exhibits: Stimulated-recall interviews with primary school children about science centre visits** *INTERNATIONAL JOURNAL OF SCIENCE EDUCATION*
  DeWitt, J., Osborne, J.
  2010; 32 (10): 1365-1388

- **Supporting argumentation through students' questions: Case studies in science classrooms** *The Journal of the Learning Sciences*
  Chin, C., Osborne, J.
  2010; 19 (2): 230-284

- **Arguing to learn in science: The role of collaborative, critical discourse** *Science*
  Osborne, J.
  2010; 328 (5977): 463-466

- **Supporting Argumentation Through Students' Questions: Case Studies in Science Classrooms** *JOURNAL OF THE LEARNING SCIENCES*
  Chin, C., Osborne, J.
  2010; 19 (2): 230-284
- **R&D An Argument for Arguments in Science Classes** *PHI DELTA KAPPAN*
  Osborne, J. F.
  2009; 91 (4): 62-65
- **The Potential of Adapted Primary Literature (APL) for Learning: A Response** *RESEARCH IN SCIENCE EDUCATION*
  Osborne, J.
  2009; 39 (3): 397-403
- **Research and Practice: A Complex Relationship?** *QUALITY RESEARCH IN LITERACY AND SCIENCE EDUCATION: INTERNATIONAL PERSPECTIVES AND GOLD STANDARDS*
  Millar, R., Osborne, J., Shelley, M. C., Yore, L. D., Hand, B.
  2009: 41-61
- **Science education in Europe: Critical reflections**
  Osborne, J., Dillon, J.
  London: The Nuffield Foundation.2008
- **Students' questions: a potential resource for teaching and learning science** *Studies in science education*
  Chin, C., Osborne, J.
  2008; 44 (1): 1-39