

# Curriculum Vitae

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Date of Birth: 07 June 1981  
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## **CURRENT PROJECT**

Undergraduate Chemistry students need to learn several kinds of representations and conventions in order to understand the subject and to solve the problems. Our focus is on three of the representations namely, Dash-wedge diagrams, Newman projections and Fisher projections. The information about the shape of a molecule in three dimensions is embedded in all three representations. Students have problems in visualizing the molecules and in translating between different representations. We are investigating whether and how concrete models of the molecules can be useful in enhancing students understanding of there representations and translating between them.

## **AREA OF INTEREST AND EXPERTISE**

I worked as a doctoral research scholar since Aug. 2004 in the area of science education. My PhD thesis dealt with visuospatial reasoning in astronomy education. Explanation of day to day phenomena is a matter of basic scientific literacy and a part of elementary astronomy. Also, it has been seen that students as well as adults have problems in understanding the heliocentric model and explaining phenomena on the basis of that model. This kind of reasoning is called “model based reasoning” and requires spatial abilities such as mental rotation and perspective taking.

Astronomy education becomes a matter of concern because of its connection to astrology. Also India, like many other old cultures, has a rich body of indigenous knowledge of astronomy (eg. calendars) which remains unconnected to school science.

I have worked with middle school students from educationally disadvantaged background (rural, tribal and urban children from slum area). I have studied their understanding of astronomy and have developed a pedagogy which will enable students to explain the daily phenomena correctly, with the help of models, gestures and diagrams.

## PUBLICATIONS

Padalkar, S. (2010). *Spatial Cognition and Visualization in Elementary Astronomy Education*. (Ph.D. Thesis submitted to Tata Institute of Fundamental Research, Mumbai)  
Name of Thesis Adviser: Prof. Jayashree Ramadas

Padalkar, S. and Ramadas, J. (2010). Designed and spontaneous gestures in elementary astronomy education. *International Journal of Science Education*  
DOI:10.1080/09500693.2010.520348

Padalkar, S. and Ramadas, J. (2011). Using diagrams as an effective pedagogic tool in elementary astronomy. In Chunawala, S. & Kharatmal, M. (Eds.) *Proceedings of Conference epiSTEME-4*, Mumbai, India, 5-9 Jan. 2011, 159-164.

Subramaniam, K. and Padalkar, S. (2009). Visualisation and reasoning in explaining the phases of the moon. *International Journal of Science Education*, 31 (3), 395-417.

Padalkar, S. and Ramadas, J. (2009). An indigenous approach to elementary astronomy - How cognitive research can help. In Subramaniam, K. & Mazumdar, A. (Eds.), *Proceedings of Conference epiSTEME-3*, Mumbai, India, 5-9 Jan. 2009, 69-75.

Padalkar, S. and Ramadas, J. (2008). Modeling the round earth through diagrams. *Astronomy Education Review*, 6 (2), 54-74. <http://dx.doi.org/10.3847/AER2007018>

Padalkar, S. and Ramadas, J. (2008). Indian students' understanding of astronomy. In *electronic Proceedings of Conference of Asian Science Education (CASE2008)*, Kaohsiung, Taiwan, February, 2008.

Padalkar, S. and Subramaniam, K. (2007). Reasoning processes underlying the explanation of the phases of the moon. In Natarajan, C. & Choksi, B. (Eds.), *Proceedings of Conference epiSTEME-2*, Mumbai, India, 12-15 Feb. 2007, 121-125.

## PRESENTATIONS

### Talks Delivered:

An Indigenous Approach to Elementary Astronomy - How Cognitive Research can Help. *Conference epiSTEME-3; HBCSE, Mumbai, India; 5-9 Jan 2009*

International Year of Astronomy: From the Perspective of Science Education  
*Workshop for International Year of Astronomy at HBCSE (TIFR), Mumbai; 27 Dec. 2008*

Visuospatial Reasoning in Elementary Astronomy Education  
*Hegarty Spatial Thinking Lab, Department of Psychology, University of California Santa Barbara; 1 July 2008*

Indian Students' understanding of elementary astronomy

*Conference of Asian Science Education (CASE2008); Kaohsiung, Taiwan; 20 to 23 Feb. 2008.*

*ASET Colloquium; Tata Institute of Fundamental Research, Mumbai; 1 Feb. 2008.*

Modeling the round Earth through Diagrams

*Homi Bhabha Seminar; HBCSE, Mumbai; 20 Dec. 2008.*

### **Poster Presentations:**

How Gestures Facilitate Visualization in Elementary Astronomy

*Gordon Research Conference on Visualization in Science and Education; Magdalen College, Oxford, UK, during 26 to 31 July 2007.*

Modeling the round Earth through Diagrams

*Gordon Research Conference on Visualization in Science and Education; Bryant University, USA during 1 to 6 July 2007.*

*National Initiative in Science Education; Bhabha Atomic Research Centre, Mumbai; 11 to 15 Dec. 2007*

Reasoning Processes Underlying the Explanation of the Phases of the Moon.

*Conference epiSTEME-2, HBCSE, Mumbai; 12 to 15 Feb 2007*

## **PARTICIPATION IN PROGRAMS**

**Project Moon In The Sky (MITS):** I, along with Dr. K. Subramaniam, worked on misconceptions and explanations about phases of the moon. We worked with participants pursuing a Masters in Design (already holding a Bachelors degree in Architecture) and with those with a Masters degree in Physics pursuing a career in physics or physics education research. We identified the different strategies used by these subjects and found that the choice and efficiency of a strategy depends upon the participant's background. In particular, we found that architects have developed spatial skills which enable them to solve the given problem faster and more accurately than Physics students do.

**Summer School Projects with School Students:** The Inter University Center for Astronomy and Astrophysics (IUCAA, Pune) conducts a summer school for middle school students. I helped one such group of five students to work out their project on stellar evolution.

I am interested in various 'people's science movements' and was connected with local and National organizations working in the field of scientific literacy, environmental groups, experimental schools, etc.. I take part in National Science Day activities in which we set up a solar laboratory.

**Organization of Workshops:**

Workshop	Details	Dates
Physics Communication Workshop	Workshop for collage students to develop communication skills to communicate Physics to school students, teachers and community	9 to 13 Oct. 2006
Shikshak Shibir	Orientation camp for primary teachers who use Small Science TextBooks published by HBCSE	4 to 6 Jan. 2006

**Participation in Workshops and Conferences:**

Conference	Location	Dates
Conference epiSTEME-4	HBCSE, Mumbai, India	5 to 9 Jan. 2011
Gordon Research Conference on Visualization in Science and Education	Magdalen College, Oxford, UK	26 to 31 July 2009
Assessing the Effectiveness of Visualization Projects	Magdalen College, Oxford, UK	24 to 26 July 2009
Conference epiSTEME-3	HBCSE, Mumbai, India	5 to 9 Jan. 2009
Workshop for International Year of Astronomy	HBCSE, Mumbai, India	27-28 Dec. 2008
Conference of Asian Science Education (CASE2008)	Kaohsiung, Taiwan	20 to 23 Feb. 2008
National Initiative in Science Education	BARC, Mumbai, India	11 to 15 Dec. 2007
Conference epiSTEME-2	HBCSE, Mumbai, India	12 to 15 Feb 2007
Workshop on “Diagrams” By Prof. Barbara Tversky from Department of Psychology, Stanford University, USA.	HBCSE, Mumbai, India	11 - 17 Feb. 2007
Workshop on “ Understanding Causality and explanation” by Prof. Stathis Psillos from Department of History & Philosophy of Science, University of Athens, Greece.	HBCSE, Mumbai, India	5 to 9 Feb 2007
Second European Cognitive Science Conference (EuroCogSci07)	Delphi, Greece	23 to 25 May 2007

Conference	Location	Dates
Workshop “How to Teach Not to Tell” by Prof. Eleanor Duckworth, from Harvard Graduate School of Education, USA.	Mumbai, India	1 Jan. 2006
Workshop for Pre Primary Teachers (Conducted by Shivaji University and Buniyadi Shikshan Kendra)	Kolhapur, India	1 - 2 Oct. 2005
International Conference on Physics Education	Delhi, India	21 to 26 Aug. 2005
Conference epiSTEME-1	Panjim, Goa, India	13 to 17 Dec. 2004
Workshop on “History of Science” by Prof. Michael Matthews from University of New South Wales, Australia.	Mumbai, India	Dec. 2004
Summer School on Astronomy Conducted by IUCAA.	Pune, India	May 2002

## EDUCATION

Examination	Board / University	Year of Passing	Marks (%)
SSC	Kolhapur Board	1996	80
HSSC	Kolhapur Board	1998	74
B.Sc. (Physics)	Shivaji University, Kolhapur	2001	73
M.Sc. (Physics)	Department of Physics Pune University.	2004	56
Ph.D. (Science Education)	Tata Institute of Fundamental Research, Mumbai	2010	

## HOBBIES:

Reading Marathi poems and literature.

Watching off beat / classic movies

Working with and watching Experimental theater.

Dancing: I learned Indian classical dance ‘Kathak’ for several years.

I am interested in fine arts and appreciate handicraft.