

Ivon Mariel Arroyo

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University of Massachusetts Amherst

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PROFESSIONAL PREPARATION

Ed.D.	2003	University of Massachusetts	(Education)
M.S.	2000	University of Massachusetts	(Computer Science)
Licenciatura en Informatica (equiv. to Bachelors of Science)	1995	Universidad Blas Pascal Cordoba, Argentina	(Computer Science)

APPOINTMENTS

2007-present	Research Scientist, Computer Science Department, Univ. of Massachusetts
2003-2007	Postdoctoral Research Associate, Computer Science, Univ. of Massachusetts
1997-2003	Research Assistant, Computer Science Department, Univ. of Massachusetts
1996-1997	Computer Science Assist. Professor. Garcia Lorca College. Cordoba, Argentina
1996-1997	Instructor for FutureKids Co., an american company devoted to teaching technology to children and professional development. Cordoba, Argentina
1991-1993	English as a second language teacher at IICANA bi-national center (Argentine-United States Cultural Exchange Institute). Cordoba, Argentina.

SYNERGISTIC ACTIVITIES

Dr. Arroyo is internationally known as an active researcher in the area of intelligent multimedia tutoring systems and software learning environments for mathematics. She is known for her interdisciplinary proficiency in both Mathematics/Technology Education and Computer Science. Probably most known for her studies about customizing tutoring software to qualitative student characteristics (gender and cognitive traits), but also for the creation of pedagogically effective help modules that are used in local schools, rigorous evaluations of educational software, testing for the impact of software not only on students' achievement but especially on attitudes and affect. She has collaborated with researchers from several countries, and is currently working on a book on "Diagnosing and responding to affect in Educational Software" with several renowned cognitive and computer science researchers from the United Kingdom and the rest of the world. Dr. Arroyo has participated in several multidisciplinary projects: i) Learning to Teach --using machine learning techniques to predict student learning and attitudes; ii) Customizing Resources for NSDL --customizing mathematics material within a digital library for each student; iii) AnimalWorld --enhancing high school women's mathematical competence; iv) AnimalWatch -- enhancing young girls' math competence and attitudes towards mathematics and computers; and on v) the recently awarded "What kind of Math Software Works for Girls?"

AWARDS AND HONORS

- Elected Member, Executive Committee of Artificial Intelligence in Education Soc., 2003-2007
- Workshops co-Chair, the 13th International Conference on AI in Education, 2007
- Program Committee, the 13th International Conference on AI in Education, 2007
- Program Committee, IX Argentine Symposium on Artificial Intelligence, 2007
- Invited Speaker, VIII Argentine Symposium on Artificial Intelligence, 2006
- Awarded an O-1 visa for permanence in the United States for Individuals of Extraordinary Ability, 2006.
- Invited discussant, "New emerging technologies for learning and instruction" session at the American Educational Research Association annual meeting. San Diego, CA., 2004

Curriculum Vitae for Ivon Arroyo

- Fellow, Fulbright Masters Program, 1996

COLLABORATORS & OTHER AFFILIATES

Recent Collaborators and Co-Editors

Andrew Barto, Computer Science Chair. University of Massachusetts Amherst
Beverly Woolf, Computer Science, Research Professor. University of Massachusetts Amherst
James Royer, Department of Psychology, Professor. University of Massachusetts Amherst
Ryan Baker, Human Computer Interaction Institute. Research Fellow, Carnegie Mellon Univ.
Carole Beal, Information Sciences Institute, Research Fellow. University of Southern California
Joseph Beck, Computer Science, Research Fellow. Worcester Polytechnic Institute, MA
Ben du Boulay, School of Cognitive & Computing Sciences, Professor. University of Sussex, UK
Winslow Burleson, Computer Science, Professor. Arizona State University
Ricardo Conejo, Computer Science, Professor. Universidad de Malaga, Spain
Javier Diaz, Computer Science Chair, Universidad Nacional de La Plata, Argentina
Donald Fisher, Mechanical & Industrial Engineering, Professor. University of Massachusetts
Rosemary Luckin, London Knowledge Lab, Research Fellow. University of London, UK

Graduate and Postdoctoral Advisors

Beverly P. Woolf, Computer Science, University of Massachusetts Amherst
Carole Beal, Information Sciences Institute, University of Southern California
Tom Murray, Cognitive Science, Hampshire College, Massachusetts
Howard Peelle, School of Education, University of Massachusetts Amherst

GRANTS and other AWARDS

- July 2008. Federal Department of Education Award. National Center for Education Research. Institute of Education Sciences. Education Technology Program. “Teaching Every Student: Using Intelligent Tutoring and Universal Design to Customize the Mathematics Curriculum”. Grant awarded to Woolf, B., Arroyo I. (co-Principal Investigator) and Malloy, B. University of Massachusetts Amherst. \$1,348,601 for 3 years.
- September 2007. National Science Foundation Award 0734060. (HRD: GSE/RES) What kind of Math Software works for Girls? The effectiveness of motivational and cognitive interventions (Principal Investigator). Grant awarded to Arroyo, I., Woolf, B. and Royer, J. for 3 years. \$145,549 per year.
- October 2007. National Science Foundation Award 0705554. (IIS: HCC) Collaborative Research: Affective Learning Companions: Modeling and supporting emotion during learning. Grant awarded to Woolf, B.P., Fisher, D., Barto, A., Arroyo, I. (co-Principal Investigator) for 3 years. \$185,634 per year.
- November 2005. National Science Foundation Award 0532776. NATIONAL SMETE DIGITAL LIBRARY. Woolf, B. P.; Arroyo, I.; Weimar, S. Customizing Resources for NSDL (Co-Principal Investigator). Grant awarded for 2 years. \$434,088 per year.
- June 2005. Institute of Education Sciences. U.S. Department of Education, awarded to Schorr, H. and Beal, C. (USC/ISI) with a subcontract for Arroyo, I. & Woolf, B.P. “Animalwatch: an intelligent tutoring system for Grade 6 mathematics”. \$1.5M, with a UMass subcontract for \$69,332 per year for 3 years.
- January 2005. Massachusetts Verizon Foundation Award. Arroyo, I.; Woolf, B. High Stakes Testing and the Science and Engineering Pipeline: Increasing Math Success for Girls Using

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Broadband Internet Access. To improve math success for students in urban-Springfield, Massachusetts. \$25,000.

September 2004. National Science Foundation Award 0411776. Research on Learning and Education. Woolf, B. P.; Arroyo, I.; Fisher, D.; Mahadevan, S.; Barto, A. Learning to Teach: The Next Generation of Intelligent Tutor Systems (Co-Principal Investigator). Grant awarded for 3 years. \$434,088 per year.

September 2003. Nominated and elected member of the executive committee of the International Society of Artificial Intelligence in Education, an international society of 600 members from 40 different countries carrying out top research on education, cognitive science and artificial intelligence for educational technology innovations (<http://www.iaied.org>).

September 2002. One-year Graduate School Fellowship in support of doctoral dissertation. Graduate School at University of Massachusetts Amherst, MA.

July 1999. Best poster award for: Beck, J. E., Arroyo, I., Beal, C. R., and Beal, C. R.. An Ablative Evaluation. Ninth International Conference on Artificial Intelligence in Education. pp. 611-613. Le Mans, France.

September 1994. First prize at the XXIII JAIIO student-level contest, organized by SADIO (Argentine Society of Informatics), for the research and development project on automatic object detection called “Cells++: a cell counter”, with Agustin Schapira. Buenos Aires, Argentina.

PRESS

http://www.masslive.com/news/index.ssf/2008/06/umass_awarded_grant_to_develop.html

<http://www.sciencedaily.com/releases/2008/03/080306220547.htm>

<http://www.eschoolnews.com/news/top-news/?i=54266>

COMMITTEES, REVIEW PANELS

Summer 2008. Member of the Program Committee for the 20th International Conference on Intelligent Tutoring Systems, Montreal, June 2008.

Summer 2007. Workshops Co-chair (with Joseph Beck, CMU) for the 13th International Conference of Artificial Intelligence in Education, Marina del Rey, CA, July 9-13 2007.

Summer 2007. Member of the Program Committee of the 13th International Conference of Artificial Intelligence in Education, Marina del Rey, CA, July 9-13 2007.

Spring 2006. Member of the organizing committee of the second workshop on “Educational Data Mining”. Eighth conference on Intelligent Tutoring Systems. Taiwan.

July 2004. Member of the organizing committee of the workshop “Workshop on Dialog-Based Intelligent Tutoring Systems: State of the Art and New Research Directions”. [Intelligent Tutoring Systems 2004](#). Alagoas, Brazil.

April, 2004. Discussant for the session "New emerging technologies for learning and instruction" at the American Educational Research Association annual meeting. San Diego, CA.

September 2003. Nominated and elected member of the executive committee of the International Society of Artificial Intelligence in Education, to serve through 2007.

July 2003. Member of the organizing committee of the workshop “Advanced Technologies for Mathematics Education”. 11th International Conference on Artificial Intelligence in

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Education. Sydney, Australia.

May 2001. Co-chair of the workshop "Help Provision and Help seeking in Interactive Learning Environments", at the 10th International Conference on Artificial Intelligence in Education. San Antonio, TX.

Other service to the International Scientific Community:

Reviewer for the International Journal of Artificial Intelligence in Education. Special edition on "Open Learner Models". 2006.

Editor of the Web Site of the International Society of Artificial Intelligence in Education. 2005-2006. (<http://iaied.org>)

Reviewer for the International Conference on Artificial Intelligence in Education. 2001. 2003. 2005. 2007.

Reviewer for the International Conference on Intelligent Tutoring Systems (ITS). 2000. 2006.

Reviewer for the International Conference on Computers in Education (ICCE). 2002.

Reviewer for the International Conference on Knowledge Based Computer Systems (KBCS). 2000.

SOCIETY MEMBERSHIPS

National Council of Teachers in Mathematics.

American Educational Research Association.

International Society of Artificial Intelligence in Education.

CONFERENCE PRESENTATIONS (presentations of peer-reviewed publications)

1999. Artificial Intelligence in Education International Conference. Le Mans, France.

2000. Intelligent Tutoring Systems International Conference. Montreal, Canada.

2001. Artificial Intelligence in Education International Conference. San Antonio, TX.

2001. User Modeling International Conference. Sontofen, Germany.

2003. American Educational Research Association meeting. Chicago, IL.

2003. Artificial Intelligence in Education International Conference. Sydney, Australia.

2003. Cognitive Science International Conference. Boston, MA.

2003. Workshop of educational technology researchers from Germany and the United States. Tuebingen, Germany.

2004. American Educational Research Association meeting. San Diego, CA.

2004. Intelligent Tutoring Systems International Conference. Maceio, Brazil.

2005. Artificial Intelligence in Education International Conference. Amsterdam, Netherlands.

2006. Invited talk at the VIII Argentine Symposium on Artificial Intelligence. Intelligent Tutoring Systems: History and state-of-the-art. <http://www.exa.unicen.edu.ar/asai2006/speakers.htm>

2007. Artificial Intelligence in Education International Conference. Los Angeles, CA.

PUBLICATIONS (sorted by publishing date)

Woolf, B.; Burleson, W.; Arroyo, I.; Dragon, T; Picard, R. (2008). Towards computer tutors that detect and respond to student emotion. Accepted to special issue on Modeling and scaffolding affective experiences to impact learning, International Journal of Learning

Curriculum Vitae for Ivon Arroyo

- Technology. Inderscience Publishers.
- Dragon, T.; Arroyo, I.; Woolf, B.P.; Burleson, W.; El Kaliouby, R.; Eydgahi, H.: Viewing Student Affect and Learning through Classroom Observation and Physical Sensors. Intelligent Tutoring Systems, 9th International Conference, ITS 2008, Montreal, Canada, June 23-27, 2008, Proceedings Springer 2008: 29-39
- Arroyo, I., Ferguson, K., Johns, J., Dragon, T., Meheranian, H., Fisher, D., Barto, A., Mahadevan, S., Woolf, B.P. (2007) Repairing Disengagement with Non-Invasive Interventions. Proceedings of the 13th International Conference of Artificial Intelligence in Education. IOS Press.
- Beal, C. R., Walles, R., Arroyo, I., & Woolf, B. P. (2007). On-line tutoring for math achievement testing: A controlled evaluation. *Journal of Interactive Online Learning*, 6 (1), 43-55.
- Arroyo, I., Woolf, B., Beal, C.R. (2006). Addressing Cognitive Differences and Gender During Problem Solving. *International Journal of Technology, Instruction, Cognition and Learning*. Vol. 4, pp. 31-63.
- Ferguson, K., Arroyo, I., Mahadevan, S., Woolf, B., Barto, A. Improving Intelligent Tutoring Systems: Using Expectation Maximization To Learn Student Skill Levels. Proceedings of the Intelligent Tutoring Systems, Taiwan, June, 2006.
- Jonsson, A.; Johns, J.; Mehranian, H.; Arroyo, I.; Woolf, B.; Barto, A.; Fisher, D.; Mahadevan, S (2005). Evaluating the Feasibility of Learning Student Models from Data . American Association of Artificial Intelligence Conference. Workshop on Educational Data Mining, Pittsburgh, PA, 2005.
- Arroyo, I.; Woolf, B. (2005). Inferring learning and attitudes from a Bayesian Network of log file data Proceedings of the 12th International Conference on Artificial Intelligence in Education. Amsterdam, 2005.
- Arroyo, I., Beal, C. R., Murray, T., Walles, R., Woolf, B. P. (2004). Web-Based Intelligent Multimedia Tutoring for High Stakes Achievement Tests. 468-477. James C. Lester, Rosa Maria Vicari, Fábio Paraguaçu (Eds.): Intelligent Tutoring Systems, 7th International Conference, ITS 2004, Maceiò, Alagoas, Brazil, Proceedings. Lecture Notes in Computer Science 3220. Springer 2004.
- Arroyo, I., Murray, T., Woolf, B. P., Beal, C. R. (2004). Inferring Unobservable Learning Variables from Students Help Seeking Behavior. James C. Lester, Rosa Maria Vicari, Fábio Paraguaçu (Eds.): Intelligent Tutoring Systems, 7th International Conference, ITS 2004, Maceiò, Alagoas, Brazil, Proceedings. Lecture Notes in Computer Science 3220 Springer 2004.
- Martin, K.; Arroyo, I.(2004). AgentX: Using Reinforcement Learning to Improve the Effectiveness of Intelligent Tutoring Systems . 564-572. James C. Lester, Rosa Maria Vicari, Fábio Paraguaçu (Eds.): Intelligent Tutoring Systems, 7th International Conference, ITS 2004, Maceiò, Alagoas, Brazil, August 30 - September 3, 2004, Proceedings. Lecture Notes in Computer Science 3220 Springer 2004.
- Arroyo, I., Walles, R., Beal, C. R., Woolf, B. P. (2004). Effects of web-based tutoring software on students' math achievement. American Educational Research Association annual meeting. San Diego, CA.
- Arroyo, I., Woolf, B. P. (2003) Students in AWE: changing their role from consumers to producers of ITS content. Advanced Technologies for Mathematics Education Workshop. Supplementary Proceedings of the 11th International Conference on Artificial Intelligence in Education.
- Arroyo, I., Walles, R., Beal, C. R., Woolf, B. P. (2003) Tutoring for SAT-Math with Wayang Outpost. Advanced Technologies for Mathematics Education Workshop. Supplementary Proceedings of the 11th International Conference on Artificial Intelligence in Education.
- Arroyo, I. (2003) Quantitative evaluation of gender differences, cognitive development differences and software effectiveness for an elementary mathematics intelligent tutoring

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- system. Submitted to the Graduate School of the University of Massachusetts Amherst in partial fulfillment of the requirements for the degree of Doctor of Education. In press.
- Arroyo, I., Beal, C. R., Bergman, A., Lindenmuth, M., Marshall, D., Woolf, B. P. (2003) Intelligent Tutoring for high-stakes achievement tests. Proceedings of the 11th International Conference on Artificial Intelligence in Education. IOS press.
- Arroyo, I., Murray, T., Woolf, B. P., Beal, C. R. (2003) Further results on gender and cognitive differences in help effectiveness. Proceedings of the 11th International Conference on Artificial Intelligence in Education. IOS press.
- Arroyo, I., Murray, T., Beck, J. E., Woolf, B. P., Beal, C. R. (2003) A formative evaluation of Animalwatch. Proceedings of the 11th International Conference on Artificial Intelligence in Education. IOS press.
- Beal, C. R., Arroyo, I., Royer, J. M., Woolf, B. P. (2003). Wayang Outpost: An intelligent multimedia tutor for high stakes math achievement tests. American Educational Research Association annual meeting, Chicago IL.
- Arroyo, I., Beck, J., Beal, C. R., Woolf, B. P. (2003, April). Learning within the Zone of Proximal Development with the AnimalWatch intelligent tutoring system. Accepted to the American Educational Research Association annual meeting, Chicago IL.
- Beal, C. R., Arroyo, I. (2002). The AnimalWatch project: Creating an intelligent computer mathematics tutor. In S. Calvert, A. Jordan, R. Cocking (Eds.), *Children in the digital age*. Greenwood.
- Murray, T., Arroyo, I. (2002). Towards Measuring and Maintaining the Zone of Proximal Development in Adaptive Instructional Systems. Proceedings of the Sixth International Conference on Intelligent Tutoring Systems. Biarritz, France. Published by Springer
- Arroyo, I., Woolf, B. P. Improving student models by reasoning about cognitive ability, emotions and gender. Proceedings of the eighth International Conference in User Modeling. Sonthofen, Germany. July 2001. Published by Springer
- Arroyo, I., Conejo, R., Guzman, E., Woolf, B. P. An adaptive web-based component for cognitive ability estimation. Proceedings of the Tenth International Conference on Artificial Intelligence in Education. San Antonio, TX. May 2001. pp. 456-466. Published by IOS Press
- Arroyo, I., Schapira, A., Woolf, B. P. Authoring and sharing word problems with AWE (Animalwatch web-based environment). Proceedings of the Tenth International Conference on Artificial Intelligence in Education. San Antonio, TX. May 2001. pp. 527-529. Published by IOS Press
- Eliot, C., Woolf, B. P., Arroyo, I., Beck, J. E.. Software support for students with attention problems. Proceedings of the Tenth International Conference on Artificial Intelligence in Education. San Antonio, TX. May 2001. pp. 467-475. Published by IOS Press
- Arroyo, I., Beck, J. E., Beal, C. R., Rachel E. Wing, Woolf, B. P. Analyzing students' response to help provision in an elementary mathematics Intelligent Tutoring System . Help Provision and Help Seeking in Interactive Learning Environments. Workshop at the Tenth International Conference on Artificial Intelligence in Education. San Antonio, TX. May 2001.
- Arroyo, I., Beck, J. E., Beverly Park Woolf, Beal, C. R., Klaus Schultz. Macroadapting Animalwatch to gender and cognitive differences with respect to hint interactivity and symbolism. Proceedings of the Fifth International Conference on Intelligent Tutoring Systems. Montreal, Canada. June 2000. pp. 574-583. Published by Springer
- Beal, C. R., Woolf, B. P., Beck, J. E., Arroyo, I., Klaus Schultz, David M. Hart. Gaining Confidence in Mathematics: Instructional Technology for Girls. In the of Proceedings of International Conference on Mathematics/Science Education and Technology. pp. 57-64. 2000.
- Beal, C. R., Woolf, B. P., Beck, J. E., and Arroyo, I. WhaleWatch: Promoting gender equity in

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- mathematics instruction through educational technology. Poster accepted for presentation at the European Cognitive Science Society annual meeting, Sienna Italy. 2000.
- Arroyo, I. Animalwatch: an arithmetic ITS for elementary and middle school students. "Learning Algebra with the Computer" Workshop. Fifth International Conference on Intelligent Tutoring Systems. Montreal, Canada. June 2000.
- Arroyo, I., Beck, J. E., Klaus Schultz, and Woolf, B. P. Piagetian Psychology in Intelligent Tutoring Systems. In the Proceedings of the Ninth Artificial Intelligence in Education. Le Mans, France. June 1999. pp. 600-602. Published by IOS Press
- Arroyo, I., Beck, J. E., Woolf, B. P., and Klaus Schultz. A useful prediction variable for student models: Cognitive Development level. Poster at the Seventh International Conference on User Modeling. Banff, Canada. 1999.
- David M. Hart, Arroyo, I., Beck, J. E., Beverly Park Woolf and Beal, C. R. WhaleWatch: An intelligent multimedia math tutor. In the Proceedings of the International Conference on Mathematics/science Education and Technology (M/SET99). pp. 565-570. 1999.
- Beck, J. E., Arroyo, I., Woolf, B. P., and Carole R. Beal. An Ablative Evaluation. In Proceedings of the Ninth International Conference on Artificial Intelligence in Education. pp. 611-613. Le Mans, France. June 1999. Published by IOS Press

SOME PUBLICATIONS THAT REFER MY OWN

(from first authors who have not worked with myself)

- Kim, Y., Wei, Q., Xu, B. & Ko, Y. (2007). Creating Social Affable Learning Environment. In C. Crawford et al. (Eds.), Proceedings of Society for Information Technology and Teacher Education International Conference 2007 (pp. 3277-3284). Chesapeake, VA: AACE.
- Blanchard, E., Frasson, C. Making Intelligent Tutoring Systems culturally aware: The use of Hofstede's cultural dimensions. International Conference in Artificial Intelligence, Las Vegas, USA, June 2005.
- Aleven, V., McLaren, B. M., Roll, I. and Koedinger, K.R. (2004) Toward Tutoring Help Seeking: Applying Cognitive Modeling to Meta-Cognitive Skills; In the Proceedings of the Seventh International Conference on Intelligent Tutoring Systems. Best Paper Award.
- Baylor, A. L. & Kim, Y. (2004). Pedagogical agent design: The impact of agent realism, gender, ethnicity, and instructional role. ITS 2004, the 7th International Conference in Intelligent Tutoring Systems: Maceió – Alagoas, Brasil. August 30-September 3, 2004.
- Heiner, C., Beck, J., & Mostow, J. (2004, August 30). Lessons on Using ITS Data to Answer Educational Research Questions. Proceedings of the ITS2004 Workshop on Analyzing Student-Tutor Interaction Logs to Improve Educational Outcomes, Maceio, Brazil, 1-9
- Mostow, J. (2004, August 30). Some useful design tactics for mining ITS data. ITS2004 Workshop on Analyzing Student-Tutor Interaction Logs to Improve Educational Outcomes, Maceió, Alagoas, Brazil, 20-28.
- Aleven, V., Stahl, E., Schworm, S., Fischer, F., & Wallace, R.M. (2003). Help Seeking and Help Design in Interactive Learning Environments. Review of Educational Research, 73(2), 277-320.
- Dufresne, A., Basque, J., Paquette, G., Leonard, M, Karin Lundgren-Cayrol, Prom Tep, S. (2003). Vers un modèle générique d'assistance aux acteurs du téléapprentissage. Volume 10, 2003. Numéro spécial : Technologies et Formation à distance. Revue Sciences et Techniques de l'Information et de la Communication pour l'Éducation et la Formation.
- Delozanne, E.; Prévité, D.; Grugeon, B.; Jacoboni, P. (2003) Supporting teachers when diagnosing their students in algebra, in É. Delozanne, K. Stacey (eds), Workshop Advanced Technologies for Mathematics Education, Proceedings of Artificial Intelligence in

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- Education, Sydney, July 2003, IOS Press, Amsterdam, 461-47
- Ainsworth, S.; Grimshaw, S. (2002) Evaluating the effectiveness and efficiency of the REDEEM Intelligent Tutoring System authoring tool. Technical Report 69. University of Nottingham, UK.
- Kenneth D. Forbus, Paul J. Feltovich. Smart Machines in Education. MIT Press (November, 2001). ISBN: 0262561417.