Robots in K-12 Education: A New Technology for Learning

Bradley S. Barker (University of Nebraska-Lincoln, USA), Gwen Nugent (University of Nebraska-Lincoln, USA), Neal Grandgenett (University of Nebraska-Omaha, USA) and Viacheslav I. Adamchuk (McGill University, USA)

Educational robotics provides students with a learning environment that has the potential to successfully integrate concepts within science, technology, engineering, and mathematics (STEM) into K12 learning environments in class, after school, or for robotics competitions.

Robots in K-12 Education: A New Technology for Learning explores the theory and practice of educational robotics in the K-12 formal and informal educational settings, providing empirical research supporting the use of robotics for STEM learning. An essential resource for STEM educators, the book explores processes and strategies for developing and implementing robotics-based programs and documents the impact of educational robotics on youth learning by presenting research-based descriptions of robotics technologies and programs, as well as illustrative examples of learning activities, lessons, and assessments.

Topics Covered:
- Constructionist Learning Methodologies
- Educational Robotics
- Hardware and Software for Robotics
- Innovation in Formal and Informal Educational Environments
- Medibotics
- Project-Based Learning with Robotics
- Robotics Competitions
- Robotics Outreach Programs
- Theories for Educational Robotics
- Virtual Robotics

Print: US $175.00  |  Perpetual: US $265.00  |  Print + Perpetual: US $350.00

Market: This premier publication is essential for all academic and research library reference collections. It is a crucial tool for academicians, researchers, and practitioners and is ideal for classroom use.

Bradley Barker, Associate Professor and Youth Development Specialist with Nebraska 4-H received his Ph.D. in Administration, Curriculum, and Instruction in the area of Instructional Technology in 2002. Dr. Barker spent eight years with Nebraska Educational Telecommunications where he was an Interactive Media Producer. Dr. Barker has directed media productions for the CLASS project, the Nebraska Law Enforcement Training Center, and the Nebraska National Guard. Dr. Barker has been the Principal Investigator on two National Science Foundation Grants to develop the Nebraska 4-H Robotics and GPS/GIS program and to scale-up the program to a national audience. Dr. Barker was also the PI on the National 4-H Robotics: Engineering for Today and Tomorrow curriculum development grant for National 4-H Council and CSREES. Dr. Barker's research interests include the development and evaluation of educational technology systems for STEM education in non-formal learning environments.
Section 1: Theoretical and Instructional Perspectives

Chapter 1
Educational Robotics Theories and Practice
Eguchi Amy (Bloomfield College, USA)

Chapter 2
Designing Evaluations for K-12 Robotics Education Programs
Stubbs Kristen (Electra Studios, formerly of iRobot Corporation, USA)
Casper Jennifer (The MITRE Corporation, USA)
Yanco Holly A. (University of Massachusetts Lowell, USA)

Chapter 3
Generating Transferable Skills in STEM through Educational Robotics
Nelson Carl A. (University of Nebraska-Lincoln, USA)

Chapter 4
In and Out of the School Activities Implementing IBYE and Constructionist Learning Methodologies by Means of Robotics
Demo G. Barbara (University of Torino, Italy)
Mons Michele (University of Padova, Italy)
Pina Alfredo (Public University of Navarra, Spain)
Arlegui Javier (Public University of Navarra, Spain)

Section 2: Educational Robotics in K-12 Formal Learning

Chapter 5
Robotics and Problem-Based Learning in STEM Formal Educational Environments
Grandgenett Neal (The University of Nebraska at Omaha, USA)
Oster Elliott (The University of Nebraska at Omaha, USA)
Topp Neal (The University of Nebraska at Omaha, USA)
Goeman Robert (The University of Nebraska at Omaha, USA)

Chapter 6
Medical Robotics in K-12 Education
Rockland Ronald (New Jersey Institute of Technology, USA)
Kümmler Howard (New Jersey Institute of Technology, USA)
Carpinelli John (New Jersey Institute of Technology, USA)
Hirsch Linda S. (New Jersey Institute of Technology, USA)
Burr-Alexander Levelle (New Jersey Institute of Technology, USA)

Chapter 7
Robots Underwater! Learning Science, Engineering and 21st Century Skills
McGrath Elisabeth (Stevens Institute of Technology, USA)
Lowes Susan (Teachers College, Columbia University, USA)
McKay Mercedes (Stevens Institute of Technology, USA)
Sayres Jason (Stevens Institute of Technology, USA)
Lin Peiyi (Teachers College, Columbia University, USA)

Chapter 8
Programming Robots in Kindergarten to Express Identity
Bers Marina Umanschi (Tufts University, USA)
Ertinger Alyssa B. (Tufts University, USA)

Section 3: Educational Robotics in Out-of-School Time

Chapter 9
The Impact of Educational Robotics on Student STEM Learning, Attitudes, and Workplace Skills
Nugent Gwen C. (University of Nebraska-Lincoln, USA)
Barker Bradley (University of Nebraska-Lincoln, USA)
Grandgenett Neal (University of Nebraska-Omaha, USA)

Chapter 10
The Mediating Role of Context in an Urban After-School Robotics Program
Baker John Y. (University of Pennsylvania, USA)

Chapter 11
Building Technical Knowledge and Engagement in Robotics
Gomez Kimberly (University of California Los Angeles, USA)
Bernstein Debra (TERC, USA)
Zywica Jolene (University of Pittsburgh, USA)
Hammer Emily (Carnegie Mellon University, USA)

Section 4: Learning through Educational Robotics Competitions

Chapter 12
STEM Outreach with the Bob-Boi®
Cole Ronda K. (New Mexico Institute of Mining and Technology, USA)

Chapter 13
Developing and Evaluating a Web-Based, Multi-Platform Curriculum for After-School Robotics
Martin Fred G. (University of Massachusetts Lowell, USA)
Scribner-MacLean Michelle (University of Massachusetts Lowell, USA)
Christy Sam (Machine Science Inc., USA)
Radnicki Ivan (Machine Science Inc., USA)

Chapter 14
Learning Geospatial Concepts as Part of a Non-Formal Education Robotics Experience
Adamchuk Viacheslav (McGill University, Canada)
Barker Bradley (University of Nebraska-Lincoln, USA)
Nugent Gwen (University of Nebraska-Lincoln, USA)
Grandgenett Neal (University of Nebraska at Omaha, USA)
Patent-Nygren Megan (University of Nebraska-Lincoln, USA)
Lutz Collin (Virginia Polytechnic Institute and State University, USA)
Morgan Kathy (University of Nebraska-Lincoln, USA)

Chapter 15
From Grade School to Grad School
Mead Ross A. (University of Southern California, USA)
Thomas Susan L. (SIU Edwardsville, USA)
Weinberg Jerry B. (SIU Edwardsville, USA)

Chapter 16
Promoting Diversity and Public School Success in Robotics Competitions
Rosen Jeffrey (Georgia Institute of Technology, United States of America)
Stillwell Fred (Georgia Institute of Technology, United States of America)
Usselman Marion (Georgia Institute of Technology, United States of America)

Chapter 17
Educational Robotics and Broadening Participation in STEM for Underrepresented Student Groups
Ludi Stephanie (Rochester Institute of Technology, USA)
<table>
<thead>
<tr>
<th>Name: ________________________________</th>
<th>☐ Enclosed is check payable to IGI Global in US Dollars, drawn on a US-based bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organization: ________________________</td>
<td>☐ Credit Card ☐ Mastercard ☐ Visa ☐ Am. Express</td>
</tr>
<tr>
<td>Address: ______________________________</td>
<td>3 or 4 Digit Security Code: ________________________________</td>
</tr>
<tr>
<td>City, State, Zip: _____________________</td>
<td>Name on Card: ________________________________</td>
</tr>
<tr>
<td>Country: ______________________________</td>
<td>Account #: ________________________________</td>
</tr>
<tr>
<td>Tel: ________________________________</td>
<td>Expiration Date: ________________________________</td>
</tr>
<tr>
<td>Fax: ________________________________</td>
<td></td>
</tr>
<tr>
<td>E-mail: ______________________________</td>
<td></td>
</tr>
</tbody>
</table>