

Advances in Mathematics Education

Roza Leikin

Bharath Sriraman *Editors*

Creativity and Giftedness

Interdisciplinary perspectives from
mathematics and beyond

 Springer

Advances in Mathematics Education

Series Editors

Gabriele Kaiser, University of Hamburg, Hamburg, Germany

Bharath Sriraman, The University of Montana, Missoula, MT, USA

International Editorial Board

Ubiratan D'Ambrosio (São Paulo, Brazil)

Jinfa Cai (Newark, NJ, USA)

Helen Forgasz (Melbourne, Victoria, Australia)

Jeremy Kilpatrick (Athens, GA, USA)

Christine Knipping (Bremen, Germany)

Oh Nam Kwon (Seoul, Korea)

More information about this series at www.springer.com/series/8392

Roza Leikin • Bharath Sriraman
Editors

Creativity and Giftedness

Interdisciplinary perspectives from
mathematics and beyond

 Springer

Editors

Roza Leikin
Faculty of Education
RANGE Center, University of Haifa
Haifa, Israel

Bharath Sriraman
Department of Mathematical Sciences
The University of Montana
Missoula, Montana, USA

ISSN 1869-4918

ISSN 1869-4926 (electronic)

Advances in Mathematics Education

ISBN 978-3-319-38838-0

ISBN 978-3-319-38840-3 (eBook)

DOI 10.1007/978-3-319-38840-3

Library of Congress Control Number: 2016947794

© Springer International Publishing Switzerland 2017

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made.

Printed on acid-free paper

This Springer imprint is published by Springer Nature
The registered company is Springer International Publishing AG Switzerland

Contents

1	Introduction to Interdisciplinary Perspectives to Creativity and Giftedness	1
	Roza Leikin and Bharath Sriraman	
Part I Perspectives on Creativity		
2	Creativity, Imagination, and Early Mathematics Education	7
	Maciej Karwowski, Dorota M. Jankowska, and Witold Sz wajkowski	
3	Formative Assessment of Creativity in Undergraduate Mathematics: Using a Creativity-in-Progress Rubric (CPR) on Proving	23
	Milos Savic, Gulden Karakok, Gail Tang, Houssein El Turkey, and Emilie Naccarato	
4	Teacher’s Views on Modeling as a Creative Mathematical Activity	47
	Gudbjorg Palsdottir and Bharath Sriraman	
5	The Prominence of Affect in Creativity: Expanding the Conception of Creativity in Mathematical Problem Solving	57
	Eric L. Mann, Scott A. Chamberlin, and Amy K. Graefe	
6	When Mathematics Meets Real Objects: How Does Creativity Interact with Expertise in Problem Solving and Posing?	75
	Florence Mihaela Singer and Cristian Voica	
7	Constraints, Competency and Creativity in the Classroom	105
	Catrinel Haught-Tromp and Patricia D. Stokes	

8	Convergence in Creativity Development for Mathematical Capacity	117
	Ai-Girl Tan and Bharath Sriraman	
9	The Origin of Insight in Mathematics	135
	Reuben Hersh and Vera John-Steiner	
10	Creativity in Doubt: Toward Understanding What Drives Creativity in Learning	147
	Ronald A. Beghetto and James B. Schreiber	
Part II Perspectives on Giftedness		
11	What Is Special About the Brain Activity of Mathematically Gifted Adolescents?	165
	Roza Leikin, Mark Leikin, and Ilana Waisman	
12	Psychological and Neuroscientific Perspectives on Mathematical Creativity and Giftedness	183
	David H. Croypley, Martin Westwell, and Florence Gabriel	
13	What Have We Learned About Giftedness and Creativity? An Overview of a Five Years Journey	201
	Demetra Pitta-Pantazi	
14	The Interplay Between Excellence in School Mathematics and General Giftedness: Focusing on Mathematical Creativity	225
	Miriam Lev and Roza Leikin	
15	Mathematically Gifted Education: Some Political Questions	239
	Alexander Karp	
Part III Commentary		
16	Commentary on Interdisciplinary Perspectives to Creativity and Giftedness	259
	Bharath Sriraman and Roza Leikin	
	Index	265