

# Contents

---

<i>Contributors</i>	<i>xiii</i>
<i>Preface: universal readiness to develop innovators</i>	<i>xxvi</i>

## **PART I**

### **Introduction** **1**

- |   |   |
|---|---|
| 1 Innovation education: the emergence of a new discipline<br><i>Larisa V. Shavinina</i> | 3 |
|---|---|

## **PART II**

### **The nature of innovation education** **15**

- |   |    |
|---|----|
| 2 Innovation education: defining the phenomenon<br><i>Rósa Gunnarsdóttir</i>  | 17 |
| 3 The fundamentals of innovation education<br><i>Larisa V. Shavinina</i>  | 29 |
| 4 How advances in gifted education contribute to innovation education,<br>and vice versa<br><i>David Yun Dai</i>  | 52 |
| 5 Innovation education meets conceptual change research: conceptual analysis<br>and instructional implications<br><i>Stella Vosniadou and Panagiotis Kampylis</i>                                       | 68 |
| 6 New brain-imaging studies indicate how prototyping is related to<br>entrepreneurial giftedness and innovation education in children<br><i>Larry R. Vandervert and Kimberly J. Vandervert-Weathers</i> | 79 |
| 7 How can scientific innovators—geniuses be developed?: the case of Albert<br>Einstein<br><i>Larisa V. Shavinina</i>  | 92 |

<b>PART III</b>	
<b>Creativity as a foundation of innovation education</b>	<b>109</b>
8 From creativity education to innovation education: what will it take? <i>Joyce VanTassel-Baska</i>	111
9 The three-ring conception of innovation and a triad of processes for developing creative productivity in young people <i>Marcia A. B. Delcourt and Joseph S. Renzulli</i>	128
10 New creative education: when creative thinking, entrepreneurial education, and innovative education come together <i>Fangqi Xu</i>	142
<b>PART IV</b>	
<b>Assessment and identification related issues of innovation education</b>	<b>151</b>
11 Torrance's innovator meter and the decline of creativity in America <i>Kyung Hee Kim and Robert A. Pierce</i>	153
12 Do not overlook innovators!: discussing the "silent" issues of the assessment of innovative abilities in today's children—tomorrow's innovators <i>Larisa V. Shavinina</i>	168
<b>PART V</b>	
<b>From advances in giftedness and gifted education to innovation education</b>	<b>183</b>
13 Innovation education: perspectives from research and practice in gifted education <i>Lynn H. Fox</i>	185
14 An application of the schoolwide enrichment model and high-end learning theory to innovation education <i>Ruth E. Lyons and Sally M. Reis</i>	201
15 Future problem solving as education for innovation <i>Bonnie L. Cramond and Elizabeth C. Fairweather</i>	215
16 The trajectory of early development of prominent innovators: entrepreneurial giftedness in childhood <i>Larisa V. Shavinina</i>	227

<b>PART VI</b>	
<b>The role of teachers, parents, and schools in the development of innovators</b>	<b>243</b>
17 Educating wizards: developing talent through innovation education <i>Sarah J. Noonan</i>	245
18 Where did all great innovators come from?: lessons from early childhood and adolescent education of Nobel laureates in science <i>Larisa V. Shavinina</i>	258
19 Settings and pedagogy in innovation education <i>Svanborg R. Jónsdóttir and Allyson Macdonald</i>	273
20 Exploring innovative schools with preservice teachers <i>Michael Kamen and Deborah Erickson Shepherd</i>	288
<b>PART VII</b>	
<b>Research on mathematical talent and innovations in math education for developing innovators</b>	<b>301</b>
21 The dynamic curriculum: a fresh view of teaching mathematics for inspiring innovation <i>Mark Saul</i>	303
22 School textbooks as a medium for the intellectual development of children during the mathematics teaching process <i>Marina A. Kholodnaya and Emanuila G. Gelfman</i>	315
23 The interfaces of innovation in mathematics and the arts <i>Bharath Sriraman and Kristina Juter</i>	330
24 NASA press releases and mission statements: exploring the mathematics behind the science <i>Sten Odenwald</i>	341
<b>PART VIII</b>	
<b>Innovations in science education for developing innovators</b>	<b>357</b>
25 Innovation in science, technology, engineering, and mathematics (STEM) disciplines: implications for educational practices <i>David F. Feldon, Melissa D. Hurst, Christopher A. Rates, and Jennifer Elliott</i>	359

## Contents

26	The importance of informal learning in science for innovation education <i>Susan M. Stocklmayer and Bobby Cerini</i>	372
27	Designing an innovative approach to engage students in learning science: the evolving case of hybridized writing <i>Stephen M. Ritchie and Louisa Tomas</i>	385
28	An integrated approach to the study of biology <i>Sergei Danilov and Olga Danilova</i>	396
29	Socioscientific innovation for the common good <i>John Lawrence Bencze</i>	404
<b>PART IX</b>		
<b>How does technology education contribute to innovation education?</b>		<b>417</b>
30	The role and place of science and technology education in developing innovation education <i>Alister Jones and Cathy Bunting</i>	419
31	Nurturing innovation through online learning <i>Patricia Wallace</i>	430
32	E-learning as educational innovation in universities: two case studies <i>Lorraine Carter and Vince Salyers</i>	442
33	Developing an understanding of the pedagogy of using a Virtual Reality Learning Environment (VRLE) to support innovation education <i>Gisli Thorsteinsson</i>	456
<b>PART X</b>		
<b>Innovation management, entrepreneurship, and innovation education</b>		<b>471</b>
34	Creating an innovative and entrepreneurial collegiate academic program <i>Lynn A. Fish and Ji-Hee Kim</i>	473
35	Educating the innovation managers of the Web 2.0 age: a problem-based learning approach to user innovation training programs <i>Peter Keinz and Reinhard Prügl</i>	487

36	What can innovation education learn from innovators with longstanding records of breakthrough innovations? <i>Larisa V. Shavinina</i>	499
37	The role of entrepreneurs' career solidarity toward innovation: an irreplaceable relationship in career capital pyramid <i>Masaru Yamashita and Jin-ichiro Yamada</i>	513
38	Modeling the firm: constructing an integrated entrepreneurship course for undergraduate engineers <i>Pius Baschera, Fredrik Hacklin, Georg von Krogh, and Boris Battistini</i>	527
39	Igniting the spark: utilization of positive emotions in developing radical innovators <i>Birgitta Sandberg</i>	534
40	Introducing the phenomenon of the "abortion" of new ideas and describing the impact of "saved" ideas and thus implemented innovations on the economy in the case of distinguished innovators <i>Larisa V. Shavinina</i>	545
<b>PART XI</b>		
<b>Policy implications, institutional, and government efforts in innovation education</b>		<b>555</b>
41	Innovation education through science, technology, engineering and math (STEM) subjects: the UK experience <i>Frank Banks</i>	557
42	Policy on knowledge exchange, innovation and entrepreneurship <i>Alice Frost</i>	570
43	The worldwide interest in developing innovators: the case of the Center for Talented Youth (United States) and PERMATApintar (Malaysia) <i>Julian Jones and Noriah Mohd. Ishak</i>	583
44	How does Singapore foster the development of innovators? <i>Chuvee Geok Quek and Liang See Tan</i>	590

Contents

<b>PART XII</b>	
<b>Conclusions</b>	<b>605</b>
45 Overall perspectives on the future promise (and forward thrusts) of innovation education <i>Larry R. Vandervert</i>	607
<i>Index</i>	619