

Contents

Part I Twenty-First Century Skills Education on the Whole

1 Introduction	3
1.1 Goal for the Book: Fostering Meaningful Learning Experiences and a Love for Learning	4
1.2 Key Domains of Scholarship	5
1.2.1 Theoretical Perspectives of Influence	5
1.2.2 Twenty-First Century Skills	8
1.2.3 Inquiry-Based Learning	9
1.2.4 Collaborative Teaching	9
1.2.5 Collaborative Learning	10
1.2.6 Social Media for Learning	10
1.2.7 Gamification/Games for Learning	11
1.3 Organization of the Book	12
1.4 A Note About the Book’s Drafting	13
References	13
2 Twenty-First Century Skills and Global Education Roadmaps	17
2.1 Frameworks Developed for Twenty-First Century Skills	18
2.1.1 International Frameworks	19
2.2 Twenty-First Century Skills in Comparison	20
2.3 Twenty-First Century Skills in Detail	21
2.3.1 Skill Set 1: Learning and Innovation	22
2.3.2 Skill Set 2: Digital Literacies	22
2.3.3 Skill Set 3: Life and Career Skills	23
2.4 A Formula of Twenty-First Century Learning	23
2.5 Twenty-First Century Skills and the Education Roadmap in Hong Kong, Switzerland, and the U.S.	24

2.5.1 Hong Kong	24
2.5.2 Switzerland	26
2.5.3 The U.S.	27
2.6 The Need for an Inquiry-Based Pedagogical Approach	29
References.	30

Part II Twenty-First Century Skills Education: Plagiarism-Free Inquiry PjBL in Asia, Europe and North America

3 Twenty-First Century Skills Education in Hong Kong and Shenzhen, China: Inquiry Project-Based and Collaborative Teaching/Learning Supported by Wiki	35
3.1 Collaborative Approaches to Conducting Inquiry Group Project-Based Learning.	36
3.1.1 Team-Teaching Amongst School Teachers	37
3.1.2 Collaboration Between Subject Teacher and School Librarian	37
3.1.3 School Administration–Subject Teachers–Parents Collaboration.	38
3.2 Using Social Media Technology to Facilitate Collaborative Writing	39
3.2.1 Wiki	39
3.2.2 Google Docs	40
3.3 Case Studies on Collaborative Teaching and Learning of Twenty-First Century Skills	40
3.3.1 Case 1: Empirical Evidence for Collaborative Teaching in Inquiry Group PjBL (Chu 2009).	43
3.3.2 Case 2: A Refined Collaborative Teaching Approach and Using Social Media in Collaborative Teaching (Chu et al. 2011c; Tavares and Chu 2012)	48
3.3.3 Case 3: Collaborative Learning in Mainland China (Li et al. 2012)	51
3.3.4 Case 4: Developing IL Skills in a Secondary School Using Inquiry Group PjBL	52
3.4 Conclusion	55
References.	55

4	Twenty-First Century Skills Education in Switzerland: An Example of Project-Based Learning Using Wiki in Science Education	61
4.1	Notable Aspects of Science Education	62
4.1.1	Models of Science Education	62
4.1.2	Supporting Science Education with the Use of Technology	67
4.1.3	European Policy Concerning Twenty-First Century Skills	68
4.2	An Example of a Project-Based Inquiry Learning Approach in Switzerland Using Wiki as a Co-authoring and Collaboration Tool	70
4.2.1	Implementation Model	70
4.3	Case Study: Creating a Collaborative Glossary in Science Education: “Evolution”	72
4.3.1	Time Schedule, Group Building	73
4.3.2	Specific Goal	73
4.3.3	The Collaborative Glossary	73
4.4	Conclusion	75
	References	76
5	Twenty-First Century Skills Education in the U.S.: An Example of an Inquiry-Based Game Design Learning Approach	79
5.1	Technology Education in the United States	80
5.1.1	Policies and National Standards, and Implementation Challenges	80
5.1.2	Smaller Scale Pilots of Instructional Design Innovations	82
5.1.3	Industry Forces as Drivers of Educational Technology Innovations	84
5.2	Research Cases on Inquiry-Based Learning Through a U.S.-Based Game Design Curriculum, Circa 2012/2013	85
5.2.1	Inquiry-Based Game Design Program Features in 2012/2013	85
5.2.2	Theoretical Underpinnings of Globaloria	88
5.2.3	Six Contemporary Learning Abilities Framework	89
5.2.4	Study 1: Cultivation of the “CLAs” Among Student Participants in Globaloria: Research Results on Effects	92
5.2.5	Summary of Other Globaloria “Effects” Type Research	93

5.2.6 Debates Concerning Structure in Inquiry-Based Learning Contexts	93
5.2.7 Investigating Inquiry and Discovery Processes in Globaloria	97
5.3 Conclusion	99
References	101

Part III Twenty-First Century Skills Education in Schools

6 Teachers' Professional Development	109
6.1 Skills Needed for a New Teaching Style	110
6.2 Teachers' Adoption of Twenty-First Century Skills	110
6.2.1 Information Technology Literacy	111
6.2.2 Information Literacy (IL)	112
6.2.3 Media Literacy (ML)	113
6.2.4 Collaboration Skills	114
6.3 Acquisition of Twenty-First Century Teaching Skills	116
6.3.1 Twenty-First Century Skills Standards for Teachers	116
6.3.2 Strategies to Develop Teachers' Twenty-First Century Skills	117
6.3.3 Tools for Twenty-First Century Skills Development	120
6.4 Conclusion	124
References	124
7 Guides and Suggestions for Classroom Implementation	131
7.1 Step-by-Step Guide to the Implementation of Inquiry PjBL in the Classroom	131
7.1.1 Teachers' Readiness	132
7.1.2 Students' Readiness	134
7.1.3 Inquiry Design Process	135
7.1.4 Strategies for Teaching and Learning	139
7.1.5 Evaluation Mechanisms	140
7.2 Case Study on Collaborative Teaching and Inquiry PjBL Learning	141
7.2.1 Suggested Timetable for Collaborative Teaching and Inquiry PjBL (Second Year of Intervention)	145
7.2.2 Teachers' Role in the Second Year of Intervention	147
7.3 Teaching Suggestions for Subject Teachers (Second Year of Intervention)	147
7.3.1 Suggested Teaching Schedule for General Studies (GS) Teachers	147
7.3.2 Suggested Teaching Schedule for English Teachers	148
7.3.3 Suggested Teaching Schedule for Computer Studies (CS) Teachers	151

7.3.4	Suggested Teaching Schedule for School Librarians	155
7.3.5	Suggested Teaching Schedule for Language (Chinese) Teachers (Optional).	155
7.4	Using Online LMS and Authoring Tools to Support and Scaffold Student Inquiry	155
7.5	Conclusion	157
	Appendix 7.1 Sample of Reading and Writing Worksheet (Chu et al. 2012b, p. 102).	158
	Appendix 7.2 Assessment Rubrics of Writing Task	159
	References.	159
8	Assessment Instruments for Twenty-First Century Skills.	163
8.1	Overview of Assessment Instruments for Twenty-First Century Skills	163
8.2	Case Studies on Assessing Twenty-First Century Skills	164
8.2.1	Assessing Reading Literacy Through Gamification	164
8.2.2	Assessing Collaboration	168
8.2.3	Assessing Information Literacy (IL) Using IL Assessment Tools	172
8.2.4	Assessing IL and IT Literacy by Perceived Learning Progress	174
8.2.5	Assessing Media Awareness of Primary Four Students.	177
8.2.6	Measuring Knowledge Outcomes by Evaluating Product Artifacts	180
8.3	Conclusion	182
	Appendix 8.1 Back-Translated Version of the IL Assessment Tool (Adopted from Chu 2012).	183
	Appendix 8.2 Questionnaire on Students' Familiarity with IL and IT Skills (Taken from Chu et al. 2011).	185
	Appendix 8.3 Coding Protocol for a Digital Literacy Intervention Involving Student Inquiry-Based Learning and Construction of Digital Artifacts	186
	References.	189

Part IV Summary and Conclusions

9	Summary and Conclusions	195
9.1	For Teachers.	196
9.2	For Professors and Teacher Educators	198
9.3	For School Librarians.	199
9.4	For Policymakers	200
9.5	For Researchers	201
9.6	What is Next?.	203
	References.	204

21st Century Skills Development Through Inquiry-Based
Learning

From Theory to Practice

Chu, S.K.W.; Reynolds, R.B.; Tavares, N.J.; Notari, M.;

Lee, C.W.Y.

2017, XV, 204 p. 14 illus., Hardcover

ISBN: 978-981-10-2479-5