

Eric C. K. Cheng  
Joanna K. M. Chan

# Developing Metacognitive Teaching Strategies Through Lesson Study

 Springer

# Developing Metacognitive Teaching Strategies Through Lesson Study

Eric C. K. Cheng · Joanna K. M. Chan

# Developing Metacognitive Teaching Strategies Through Lesson Study

Eric C. K. Cheng   
Education University of Hong Kong  
Hong Kong, China

Joanna K. M. Chan  
ELCHK Lutheran Secondary School  
Hong Kong, China

ISBN 978-981-16-5568-5      ISBN 978-981-16-5569-2 (eBook)  
<https://doi.org/10.1007/978-981-16-5569-2>

© The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd. 2021

This work is subject to copyright. All rights are solely and exclusively licensed 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, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd.  
The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

# Preface

Since the introduction of competency-based curricula (CBC) around the world to prepare a workforce for Industry 4.0, metacognitive teaching has emerged as an innovative research agenda in education. The key concept underpinning CBC is that teachers need to help students develop metacognitive skills, including decision-making, planning, monitoring and problem-solving. As the need to expand students' capabilities to learn the competencies required for Industry 4.0 increases, it becomes crucial for teachers to develop metacognitive teaching skills. It is suggested that schools to implement CBC to enhance the metacognitive capabilities of students for achieving self-regulation and lifelong learning. The CBC recently implemented in Hong Kong has brought challenges for, and impacted on, curriculum implementation and instructional design in schools. Developing and maintaining the professional competency of teachers is a critical factor for successful curriculum reform. However, pedagogies for implementing a competency-based curriculum to develop student metacognition have not been effectively crafted because too few research has been carried out to develop a collaborative lesson-planning platform for teachers to craft such pedagogies.

This book addresses applying the Lesson Study approach for crafting metacognitive teaching knowledge and skills to tackle the impact and challenges created by and underlie the CBC. It discusses the potential of using Lesson Study for crafting pedagogies that could nurture student abilities for self-regulation for effective curriculum implementation. Chapter 1 outlines the education for addressing Industry 4.0 and self-regulation as the core learning outcome of the CBC. It raises a challenge on effectively implementing the CBC to nurture student self-regulated competencies. Chapter 2 articulates the critical characteristics of metacognition, metacognitive teaching and the role of self-regulation in effective learning. It proposes metacognitive pedagogies for implementing the CBC. Chapter 3 illustrates how Lesson Study can craft metacognitive pedagogy through a case study conducted in Hong Kong. Chapter 4 discusses the use of metacognitive teaching to enact the pattern of variation of learning study. Chapter 5 argues that knowledgeable others, the essential nature of lesson study, enable teachers to regulate and craft their teaching strategies through an experimental study. We conclude that teachers can apply lesson and learning studies to craft metacognitive pedagogies for effective CBC implementation.

This book creates new research dimensions by linking metacognitive teaching with lesson study and variation theory. The book itself adopts a metacognitive teaching design to provide scaffolding instruction for readers to experience metacognitive learning. It can serve as a roadmap to teachers and a resource with teaching tips and ideas to augment their teaching. The book contains a professional tool kit for student teachers and in-service teachers who are its target audience.

Hong Kong

Eric C. K. Cheng  
Joanna K. M. Chan

**Acknowledgements** We express gratitude to Miss Wong Fung-chi and Mr. Lee Kwok-man of the ELCHK Lutheran Secondary School for providing their lessons to us for analysis.

# Contents

<b>1 Curriculum for Nurturing Self-regulating Competencies</b>	<b>1</b>
1.1 Impacts of Industry 4.0 on Education	1
1.2 Competency-Based Curriculum for Developing 21st Century Skills	3
1.3 Implementation of a Competency-Based Curriculum	4
1.4 Self-regulation as an Intended Learning Outcome	6
1.5 Summary	7
References	7
<b>2 Metacognition and Metacognitive Learning</b>	<b>11</b>
2.1 What is Metacognition?	11
2.2 Cognitive and Metacognitive Learning Strategies	13
2.3 Theoretical Models of Metacognition	14
2.3.1 Flavell's Model (1979) of Cognitive Monitoring	14
2.3.2 Brown's Model (1987) of Metacognitive Knowledge and Regulation	15
2.3.3 Schraw's Model (1994) of Metacognition	16
2.4 Why is Metacognitive Learning Important?	17
2.4.1 Metacognition Enhances 21st Century Skills	17
2.4.2 Metacognition Improves Academic Achievements	18
2.5 Measuring Metacognition	18
2.5.1 Metacognitive Awareness Inventory (MAI)	19
2.5.2 A Study of Metacognition and Academic Results	19
2.6 Metacognitive Teaching	21
2.7 Summary	22
References	22
<b>3 Crafting Metacognitive Teaching Strategies Through Lesson Study</b>	<b>25</b>
3.1 Knowledgeable Platform for Metacognitive Teaching	25
3.1.1 Lesson Study as a Platform for Knowledgeable Others	26
3.1.2 Lesson Study for Crafting Self-regulated Learning Pedagogies	26

3.1.3	Lesson Study as a Knowledge Creation Platform	27
3.2	A Case Study	28
3.2.1	SRL as a Major Concern in Schools (Vision and Leadership)	29
3.2.2	Using Lesson Study to Develop SRL (Knowledge Acquisition)	29
3.2.3	Socialisation of Metacognitive Pedagogies	30
3.2.4	Lesson Study Case for Liberal Studies	31
3.2.5	Combination of Knowledge	36
3.2.6	Internalisation of the Metacognitive Pedagogies	37
3.3	Summary	40
	References	40
<b>4</b>	<b>Crafting of Metacognitive Teaching Strategies Through Learning Study</b>	<b>43</b>
4.1	Learning Study	43
4.2	Variation Theory	45
4.3	Learning Study Case	47
4.3.1	Select Enzymes as the Topic	47
4.3.2	Setting Object of Learning	48
4.3.3	Diagnosing Students' Learning Difficulties	49
4.3.4	Confirming the Object of Learning and Critical Feature	49
4.3.5	Ideas in the Lesson Planning	49
4.3.6	Lesson Implementation of Cycle 1 and Cycle 2	52
4.3.7	Evaluating the Learning Outcomes	58
4.4	Conclusion	58
4.4.1	Metacognitive Questions Broaden the Shared Space of Learning	58
4.4.2	Constructive Approach Facilitates the Changing of "Seeing"	59
4.4.3	Visualising a Pattern of Variation Facilitates the Discernment of Sameness and Difference	59
4.4.4	Suggestions for Improvement	59
	References	60
<b>5</b>	<b>Internalisation of Metacognitive Teaching Through Lesson Study</b>	<b>61</b>
5.1	Introduction	61
5.1.1	Explicit Teaching	62
5.1.2	Promoting Metacognitive Language	63
5.1.3	Modeling and Thinking-Aloud	63
5.1.4	Questioning, Prompts and Probes	64
5.1.5	Graphic Organisers	65
5.1.6	K-W-L Chart	66
5.1.7	Guiding Questions for Co-Operative Learning	66
5.1.8	Reciprocal Teaching	67
5.1.9	Reflective Learning	67



5.2	Instructional Design for Metacognitive Teaching .....	68
5.2.1	The Five Principles for Scaffolding Metacognitive Lessons .....	71
5.2.2	Pre-service Teachers' Perceptions of Their Changes .....	73
5.3	How Do Lesson and Learning Studies Benefit from Knowledgeable Others? .....	73
5.3.1	Lesson Study as Collaborative Action Research .....	73
5.3.2	Lesson Study as Communities of Practice .....	74
5.3.3	Organisational Learning Culture for Lesson Study .....	75
5.4	Conclusion .....	76
	References .....	77