

## Efficiency in Learning: Evidence-Based Guidelines to Manage Cognitive Load (Book Review)

### **Reviewers:**

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### **Textbook Details:**

Efficiency in Learning: Evidence-Based Guidelines to Manage Cognitive Load  
Ruth Colvin Clark, Frank Nguyen and John Sweller  
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### **Overview**

The book “Efficiency in Learning: Evidence-Based Guidelines to Manage Cognitive Load” is about using the three fundamental instructional materials: visuals, written text, and audio. The book is basically intended for instructional professionals and aims at explaining how to improve learning by focusing on student attention and avoiding redundancy in the presentation of learning material. The book is based on principles of Cognitive Load Theory (CLT), which serves as the basis for all of the guidelines within this book. Real-world examples demonstrate how these guidelines may be applied in settings ranging from a typical classroom to e-learning scenarios. A supplementary CD-ROM includes sample lessons and video commentaries by the authors. The authors of the book are Ruth Colvin Clark; who holds a doctorate in Educational Psychology and Instructional Technology from the University of Southern California; Frank Nguyen, the e-Learning Technology Manager for the Intel e-Business Training group; and John Sweller, the founder of the Cognitive Load Theory (CLT, refer to Sweller (1989)), who currently teaches at the School of Education at the University of New South Wales in Australia. John Sweller's theory, which is a central theory of learning, is based on an information processing model of human cognition and emphasizes the intrinsic limitations of the working memory, i.e. the amount of information that can be processed in short-term memory at one time. Within this book, the authors use schemas as relevant building blocks for instructional materials and they discuss three conditions of cognitive load: intrinsic (contained within the learning goal), extraneous (which is the information that is the so called “nice to know, however not need to know”), and germane cognitive load (which is the information needed to support the learning goal).

### **Chapter Summary**

This book is divided into five parts. In part one, the authors provide an introduction about the term efficiency and discuss the psychological issues of cognitive load and efficiency in learning. In part two, they present the basic guidelines for managing irrelevant cognitive load, i.e. by using visuals and audio narration to exploit working memory resources, focus attention and avoid split attention and *weeding training* to manage limited working memory capacity. Most of all, they discuss how to use segmenting, sequencing and learner pacing to impose content gradually. Finally, they discuss the transition from worked examples to practice in order to impose mental work gradually. In part three the authors present some instructional guidelines for imposing relevant cognitive load and in part four they discuss tailoring instruction to learner expertise (e.g. accommodation of differences in learning expertise and using rapid testing to adapt e-Learning to learner expertise). Finally, in part five, the authors put Cognitive Load Theory in practice. At the end of this part, John Sweller provides his personal perspective of the evolution of CLT. In the appendix, the authors provide additional information about calculating and displaying the efficiency matrix and efficiency graphs. Within the following glossary, the authors explain 69 used terms in a clear

and concise manner (e.g. Weeding = an instructional design strategy in which unnecessary content or redundant content modalities are eliminated in order to minimize cognitive load). The glossary is followed by 126 references and concluded by an index. The book is supplemented by a CD-ROM, which contains asynchronous e-Learning demonstration lessons that both apply and violate the guidelines taught within this book. The examples are commented by John Sweller.

## **Evaluation**

This book is a must read for everybody who is interested in learning and teaching. Meanwhile, it is commonly accepted that the Cognitive Load Theory has emerged as one of the most important and best researched foundations for improving the development of instructional material. Most of all, this book serves as a good example on how psychological research results can be made usable for educational practitioners. To have no background in CLT is not a problem; this book provides a sufficient introduction, anyone who is not familiar with CLT should read chapter 13, pp. 313–329 first. The presentation of the content is very well done. The chapters begin with a one page chapter outline; the chapters are well structured, the organization and style very good. At the end of each chapter there is information about the supplementing CD-ROM, a short overview about the next chapter (so called “coming next”) and well chosen recommended readings. I was extremely pleased with the “What the research says ...” boxes. They contain relevant concise descriptions of corresponding research. The only shortcoming of the book is the use of much worn standard examples (i.e. Mayer, the one with the pressure pump). Readers would have liked to have new or more practical examples instead of these standard examples. A minor cosmetic problem is that the printing sometimes goes very close to the bottom of the page.

Summarizing, I can highly recommend this book to anyone who is interested in both learning and teaching and especially those who are interested in the application of the Cognitive Load Theory.