EVIDENCE-INFORMED BUILDING BLOCKS FOR LEARNING DESIGN

Moving From Fake to the Cherry on the Cake!

learning technologies SUMMER FORUM

Mirjam Neelen

HELLO!

Twitter:
MirjamN

LinkedIn:
https://www.linkedin.com/in/mirjamneelen/

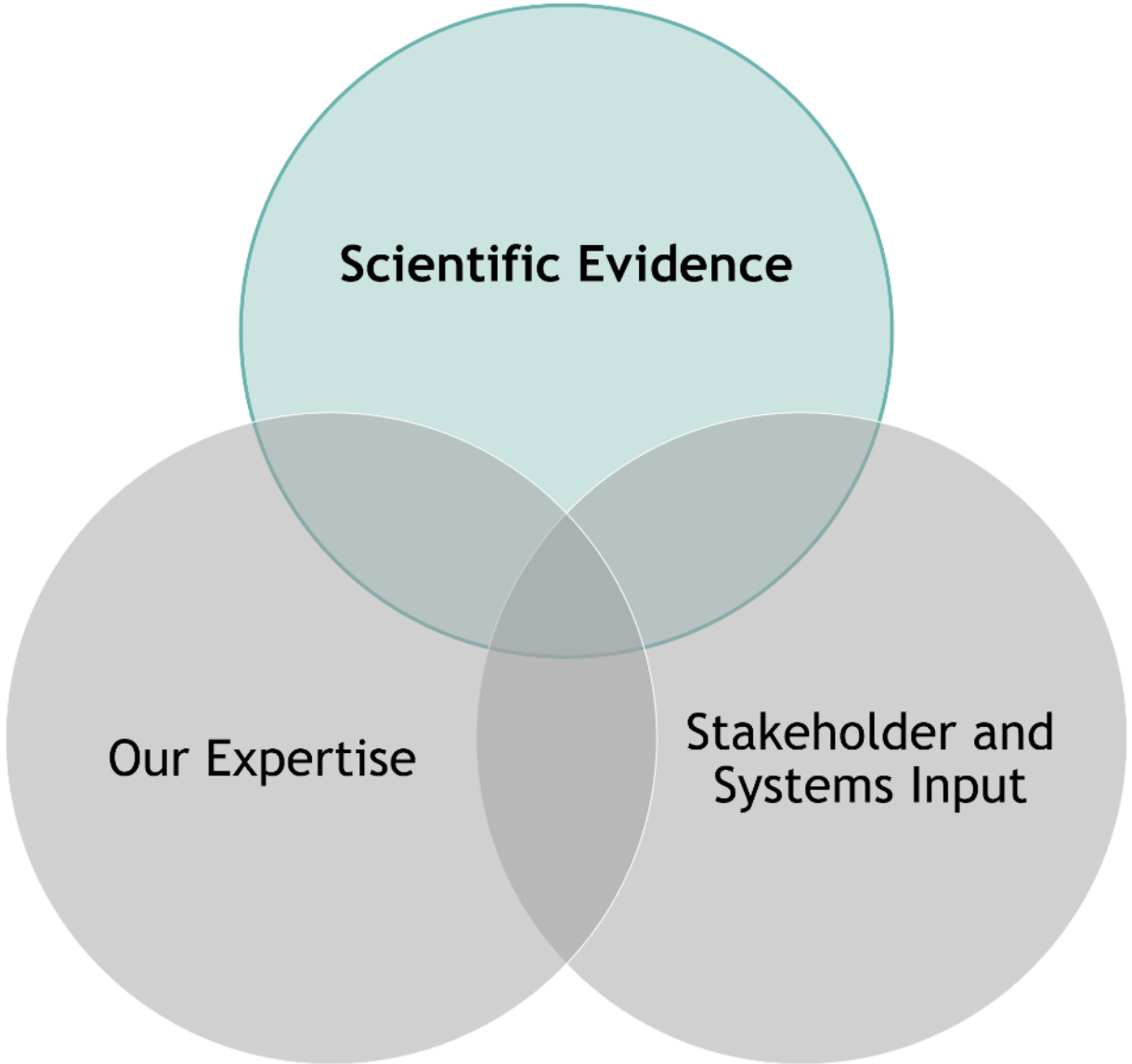
Blog:
3starlearningexperiences.wordpress.com

Book:
Evidence-Informed Learning Design

How are you already using SCIENTIFIC evidence from the LEARNING SCIENCES in your work?

FAKE IS REAL
REAL IS FAKE

Resource: https://kingdomecon.wordpress.com/2018/07/02/real-science-vs-fake-science/

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Training
Research
Complex
Learning
Self-Regulated
Learning


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Learning

The Evidence: Effective Training

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Psychological Science in the Public Interest
13(2) 74–101

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The Science of Training and Development in Organizations: What Matters in Practice

Eduardo Salas[1,2], Scott I. Tannenbaum[3], Kurt Kraiger[4], and Kimberly A. Smith-Jentsch[2]

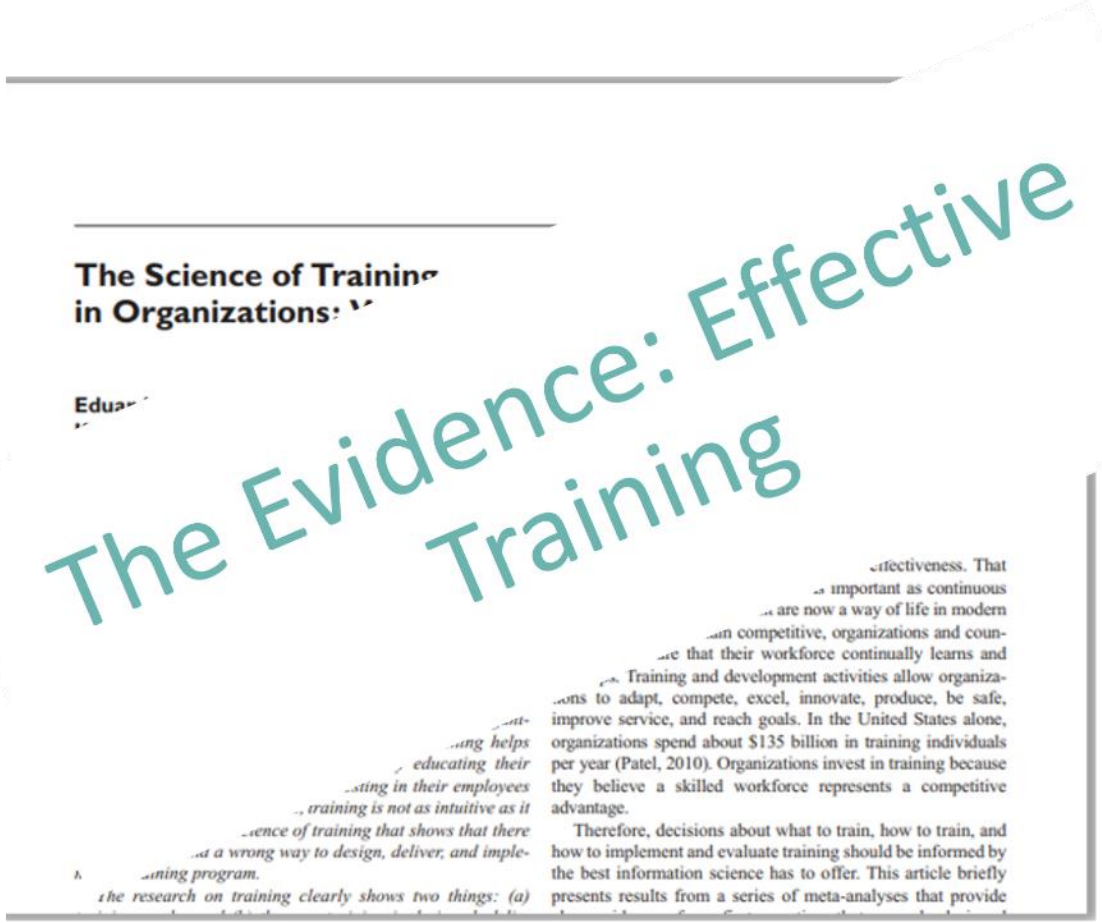
[1]Institute for Simulation & Training, University of Central Florida; [2]Department of Psychology, University of Central Florida; [3]The Group for Organizational Effectiveness, Albany, NY; and [4]Department of Psychology, Colorado State University

Summary

Organizations in the United States alone spend billions on training each year. These training and development activities allow organizations to adapt, compete, excel, innovate, produce, be safe, improve service, and reach goals. Training has successfully been used to reduce errors in such high-risk settings as emergency rooms, aviation, and the military. However, training is also important in more conventional organi-

and implemented can greatly influence its effectiveness. That well-designed training is impactful is important as continuous learning and skill development are now a way of life in modern organizations. To remain competitive, organizations and countries must ensure that their workforce continually learns and develops. Training and development activities allow organizations to adapt, compete, excel, innovate, produce, be safe, improve service, and reach goals. In the United States alone,

The Evidence: Effective Training



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organizations spend about $135 billion in training individuals
per year (Patel, 2010). Organizations invest in training because
they believe a skilled workforce represents a competitive
advantage.

Therefore, decisions about what to train, how to train, and
how to implement and evaluate training should be informed by
the best information science has to offer. This article briefly
presents results from a series of meta-analyses that provide

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Salas et al, 2012

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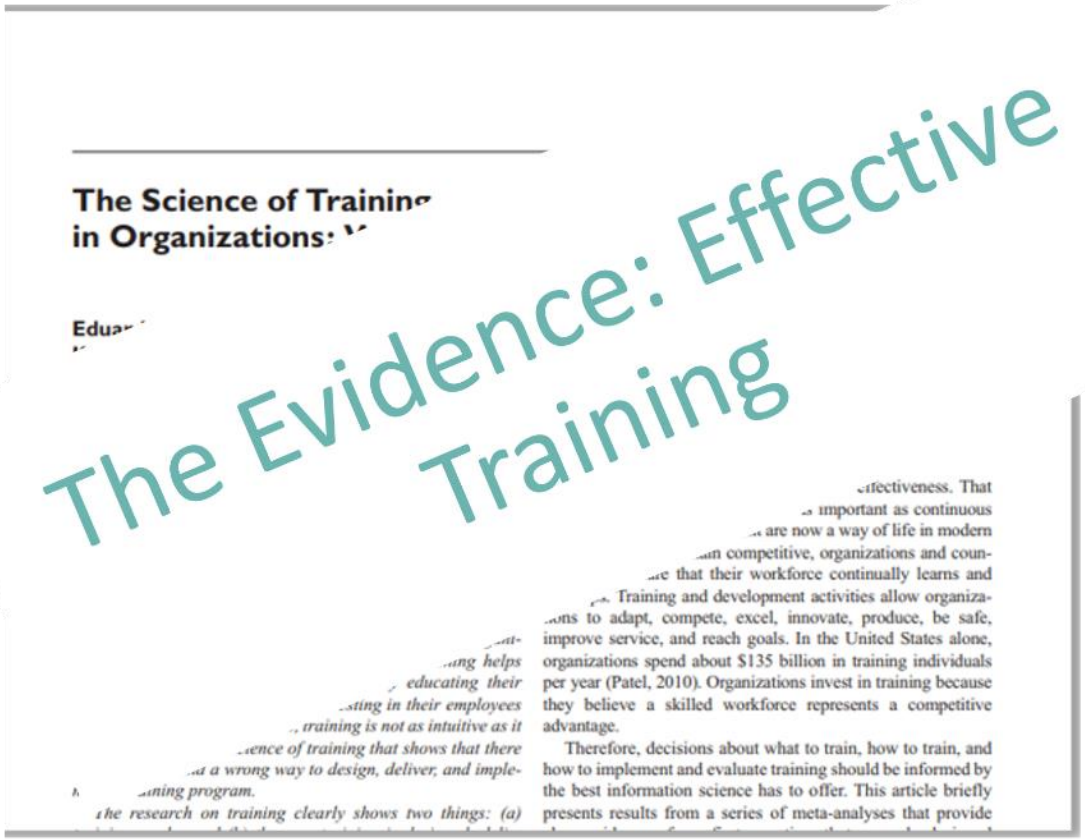
The goal is a sustainable change in behaviour and cognition.

The Evidence: Effective Training



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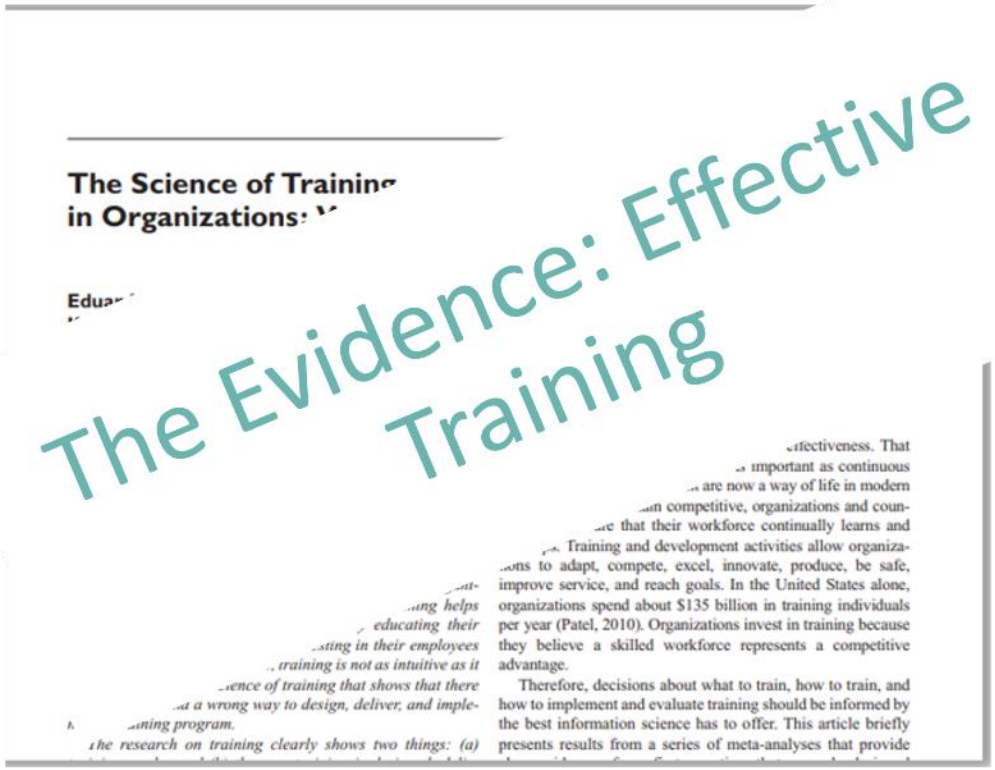
The goal of effective training is a sustainable change in behaviour and cognition.

2

Planned and systematic activities

The Evidence: Effective Training



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Salas et al, 2012

1 The goal of effective training is a sustainable change in behaviour and cognition.

2 Planned and systematic activities

3 Instruction, demonstration, practice, and feedback

TRAINING, THE FAKE WAY

We default to training

TRAINING, THE FAKE WAY

We default to training

We design poor training for the wrong reasons

TRAINING, THE FAKE WAY

We default to training

We design poor training for the wrong reasons

We bash training in general

What the evidence for effective training means for our practice

- Behaviour or cognitive change
- Process, not event
- Learning solutions vs performance support


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Training
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We Have a Ladder Safety Problem On Our Hands

We Have a Ladder Safety Problem On Our Hands

Adapted from Shank, 2017

Objectives
1. Decide which ladder is best to use given the context and nature of the job
2. Inspect the ladder before use
3. Use the ladder safely
4. Make a hazardous situation safe

We Have a Ladder Safety Problem On Our Hands

Objective	Activity
1. Decide which ladder is best to use given the context and nature of the job	Demonstrations, Scenarios
2. Inspect the ladder before use	Demonstrations, Scenarios
3. Use the ladder safely	Simulations, Job shadowing
4. Make a hazardous situation safe	Simulations, Job shadowing

We Have a Ladder Safety Problem On Our Hands

Activities are mapped to each objective separately

Objective	Activity
1. Decide which ladder is best to use given the context and nature of the job	Demonstrations, Scenarios
2. Inspect the ladder before use	Demonstrations, Scenarios
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4. Make a hazardous situation safe	Simulations, Job shadowing

Your reaction, please?

This design is (in)effective, because…

Activities mapped to each objective

Objective	Activity
1. Decide which ladder is best to use given the context and nature of the job	Demonstrations, Scenarios
2. Inspect the ladder before use	Demonstrations, Scenarios
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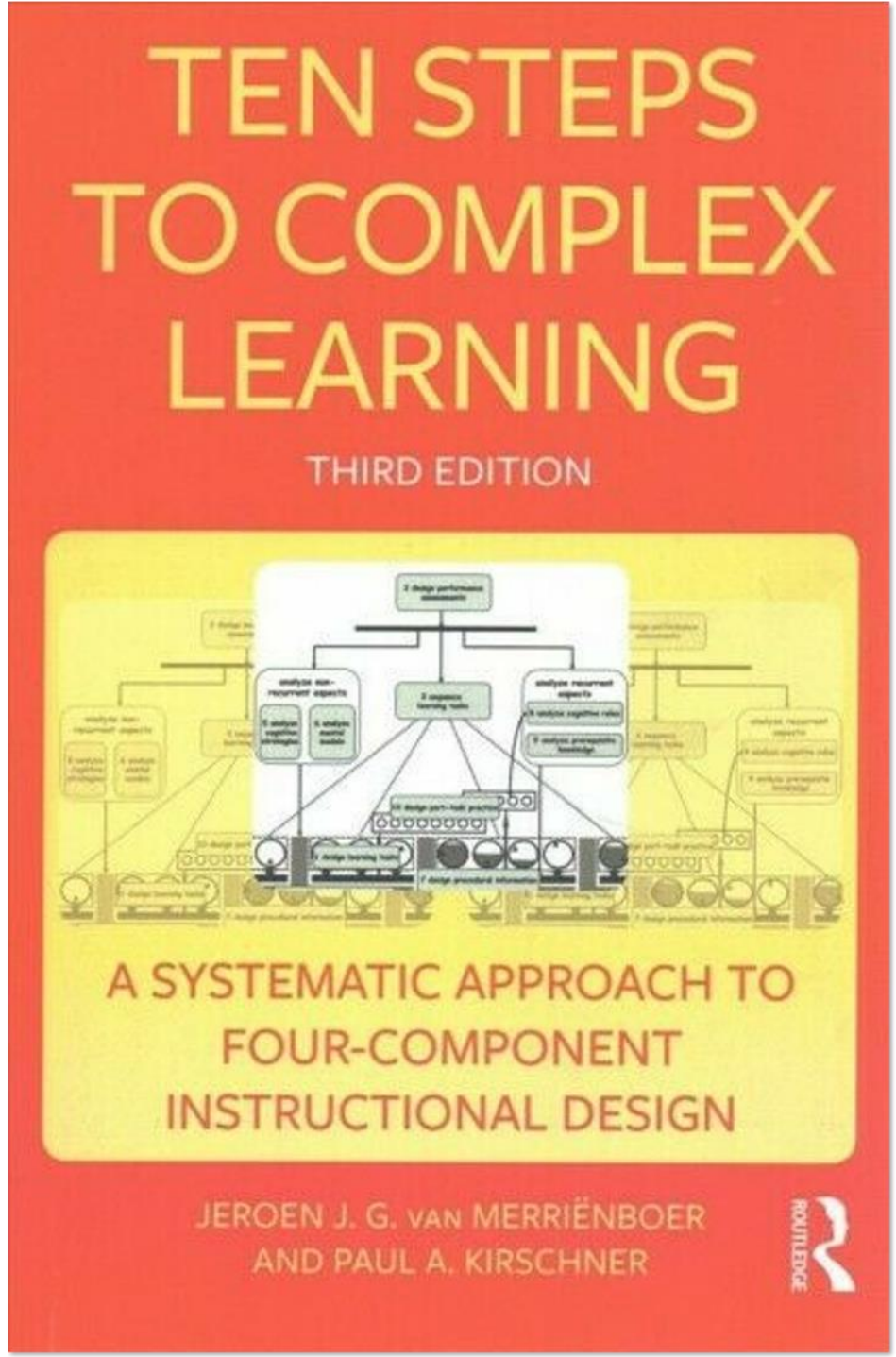
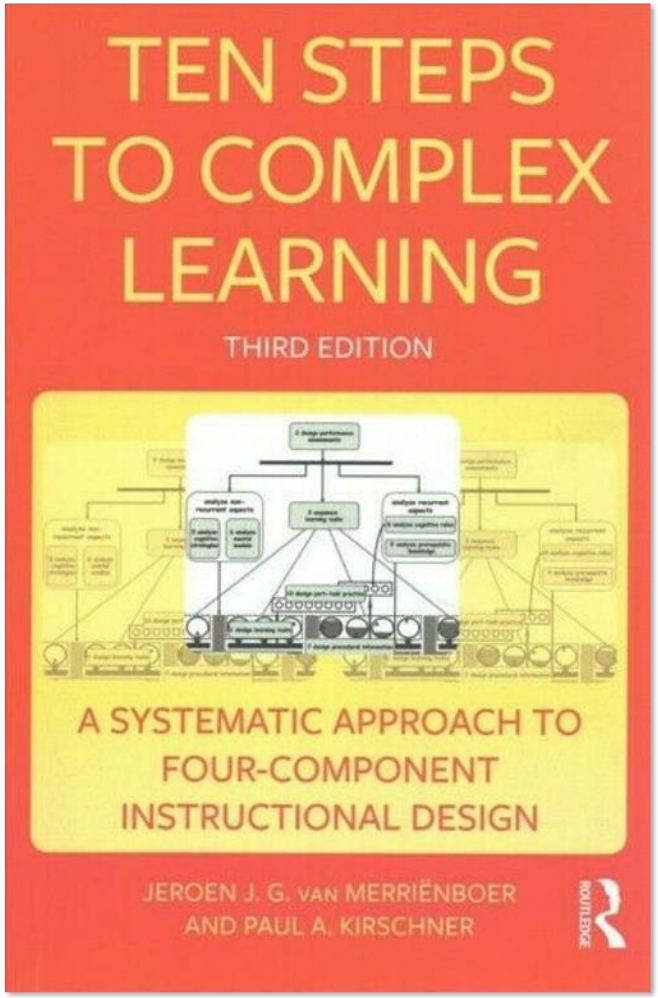
The Evidence:

Effective Design for Complex Learning



The Evidence: Effective Design for Complex Learning



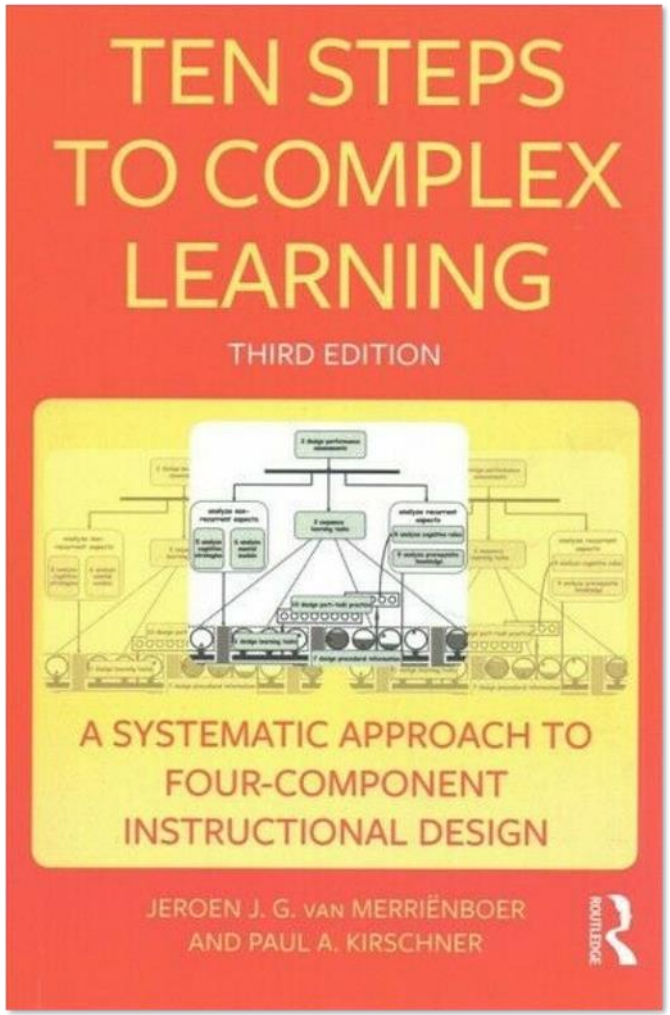
Van Merriënboer & Kirschner, 2018

1

Atomistic design does not work.

Instead …

The Evidence: Effective Design for Complex Learning



Van Merriënboer & Kirschner, 2018

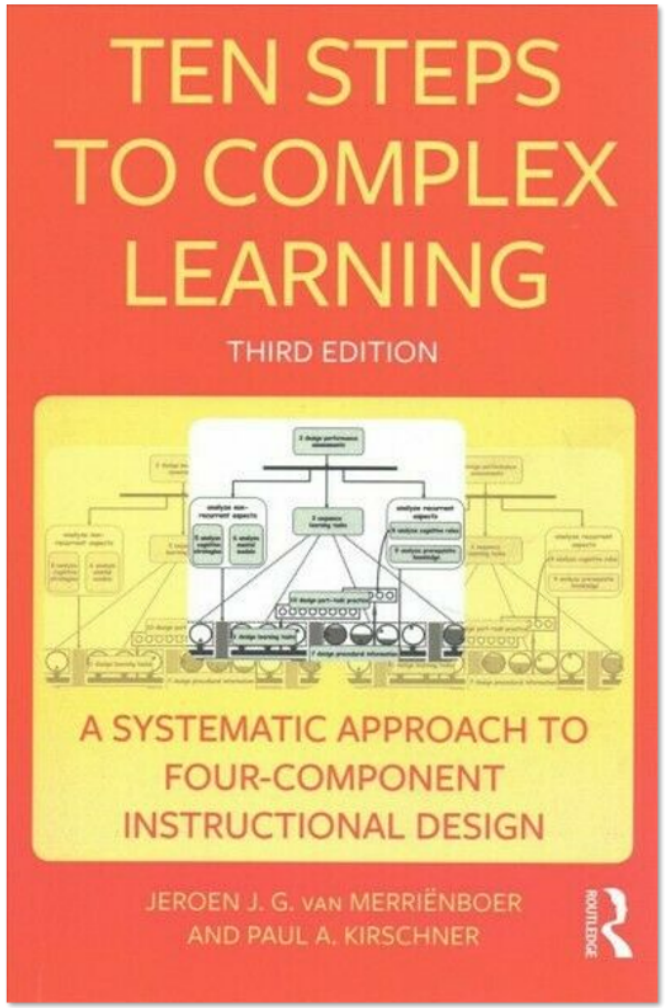
1 Atomistic design does not work.

Instead …

2 Use real-life authentic tasks

And …

The Evidence: Effective Design for Complex Learning



Van Merriënboer & Kirschner, 2018

1 Atomistic design does not work.

Instead …

2 Use real-life authentic tasks

And …

3 Provide problem-solving guidance and scaffolding

DESIGN FOR COMPLEX LEARNING, THE FAKE WAY

We reduce tasks
to
simpler/smaller
components

DESIGN FOR COMPLEX LEARNING, THE FAKE WAY

We reduce tasks to simpler/smaller components

We map activities to each objective separately

DESIGN FOR COMPLEX LEARNING, THE FAKE WAY

We reduce tasks to simpler/smaller components

We map activities to each objective separately

We distinguish between knowledge, skills, and attitudes

What the evidence for ‘design for complex learning’ means for our practice

- Real-life tasks and situations
- “Easy to difficult” sequencing
- Variability of practice
- From highly scaffolded to independent practice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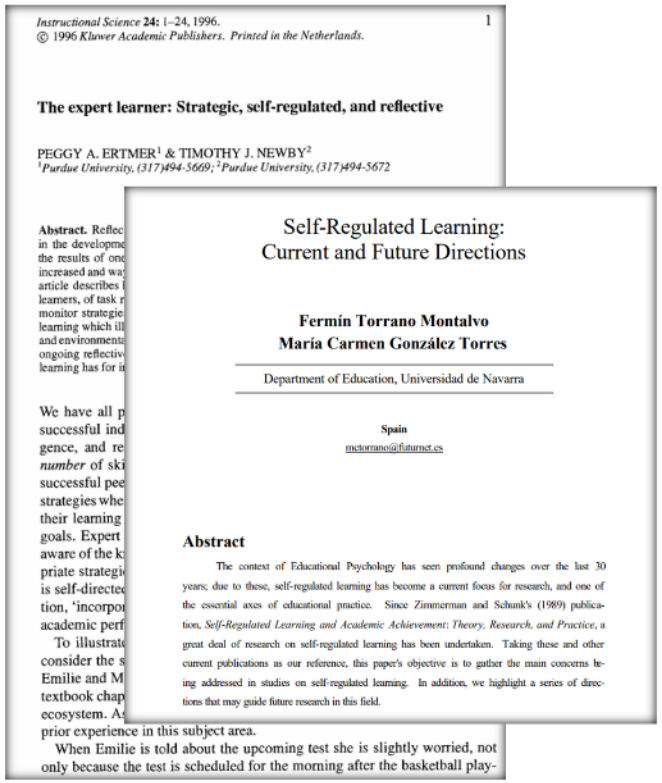
The Evidence: Self-Regulated Learning



Instructional Science **24:** 1–24, 1996. 1
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The expert learner: Strategic, self-regulated, and reflective

PEGGY A. ERTMER[1] & TIMOTHY J. NEWBY[2]
[1]*Purdue University, (317)494-5669;* [2]*Purdue University, (317)494-5672*

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Self-Regulated Learning:
Current and Future Directions

Fermín Torrano Montalvo
María Carmen González Torres

Department of Education, Universidad de Navarra

Spain
mctorrano@futurnet.es

Abstract

The context of Educational Psychology has seen profound changes over the last 30 years; due to these, self-regulated learning has become a current focus for research, and one of the essential axes of educational practice. Since Zimmerman and Schunk's (1989) publication, *Self-Regulated Learning and Academic Achievement: Theory, Research, and Practice*, a great deal of research on self-regulated learning has been undertaken. Taking these and other current publications as our reference, this paper's objective is to gather the main concerns being addressed in studies on self-regulated learning. In addition, we highlight a series of directions that may guide future research in this field.

1 Paradox

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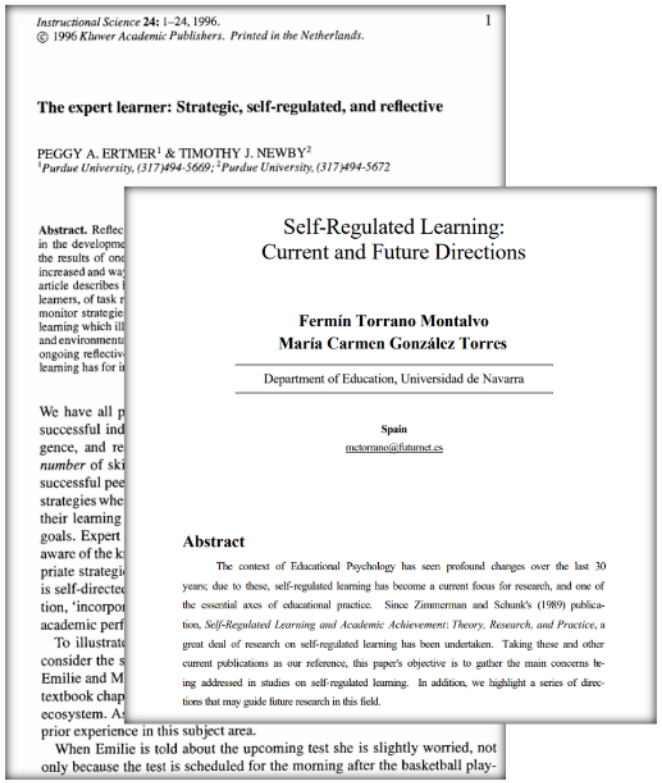
The Evidence: Self-Regulated Learning



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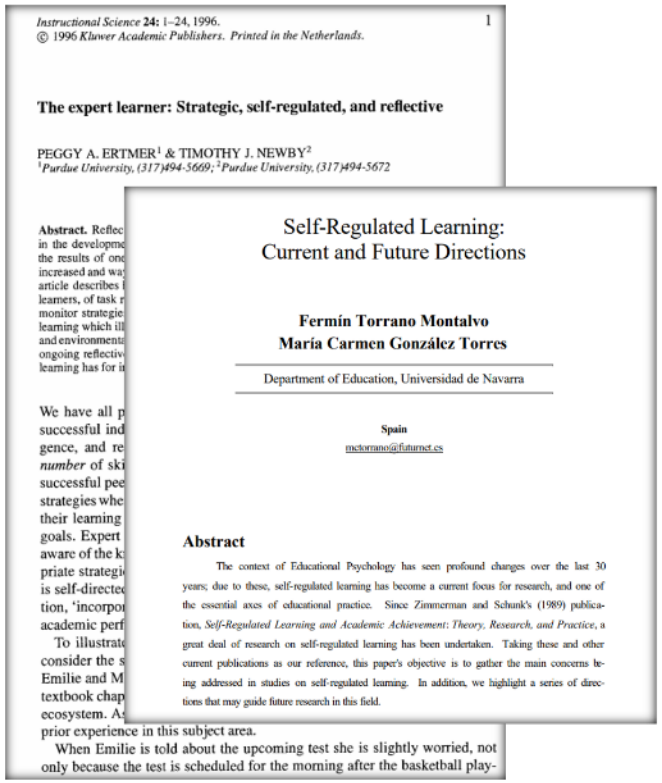
2 Learners with little domain knowledge:

- are bad at judging their own knowledge,
- have faulty mental models, and
- struggle with judging their learning outcomes

The Evidence: Self-Regulated Learning



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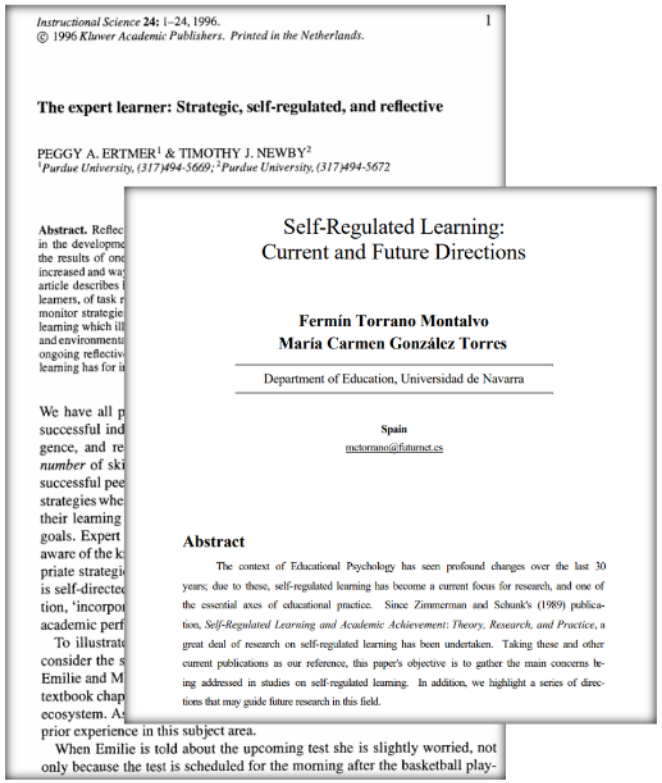

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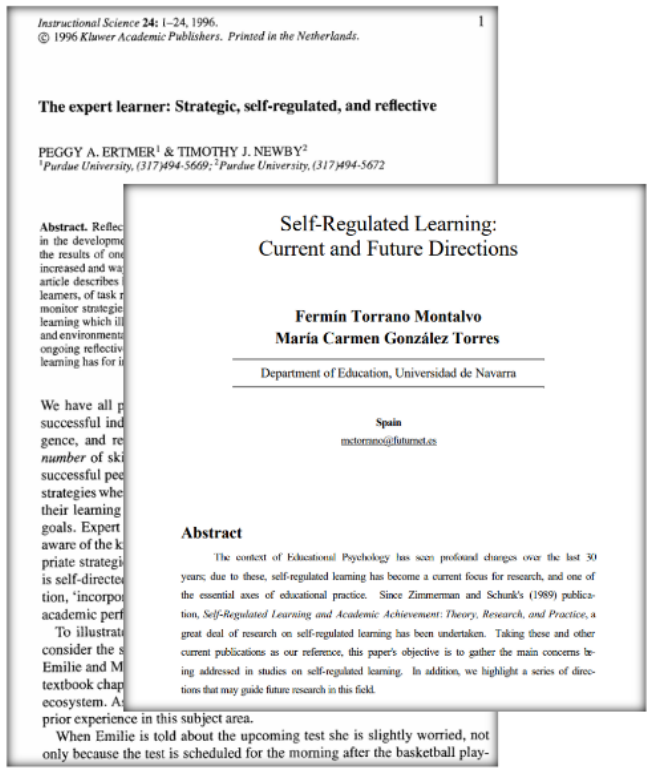

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3 Guidance to help learners regulate own learning

SELF-REGULATED LEARNING, THE FAKE WAY

We incorrectly assume that we acquire learning skills on our own

SELF-REGULATED LEARNING, THE FAKE WAY

We incorrectly assume that we acquire learning skills on our own

We throw ‘learning stuff’ at people and they need to figure it out

SELF-REGULATED LEARNING, THE FAKE WAY

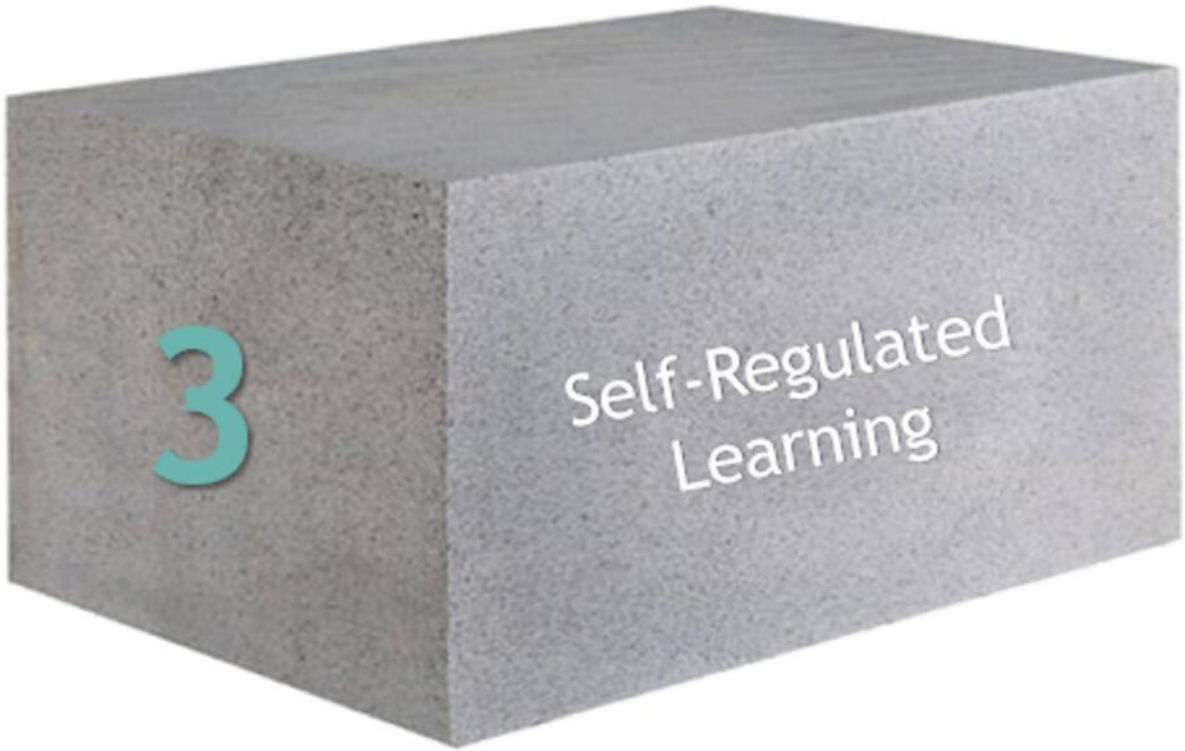
We incorrectly assume that we acquire learning skills on our own

We throw ‘learning stuff’ at people and they need to figure it out

We don’t ensure symbiotic relationship

What the evidence for ‘self-regulated learning’ means for our practice

- Support integration
- Environment that supports people
- Alignment between workers’ performance goals and organizational goals



- Behaviour or cognitive change
- Process, not event
- Learning solutions vs performance support

- Real-life tasks and situations
- “Easy to difficult” sequencing
- Variability of practice
- From highly scaffolded to independent practice

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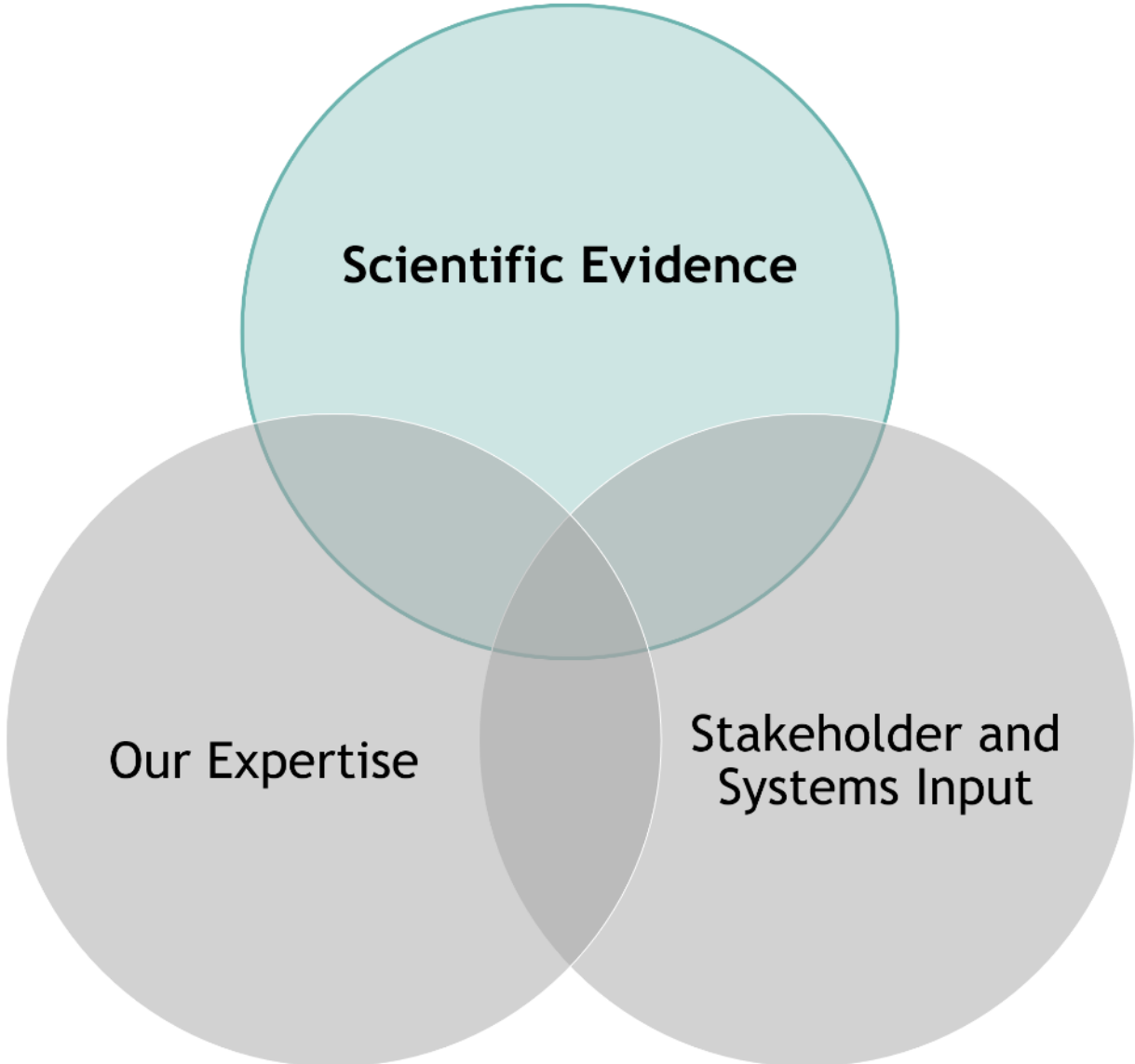
Scientific Evidence
Our Expertise
Stakeholder and Systems Input


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Training
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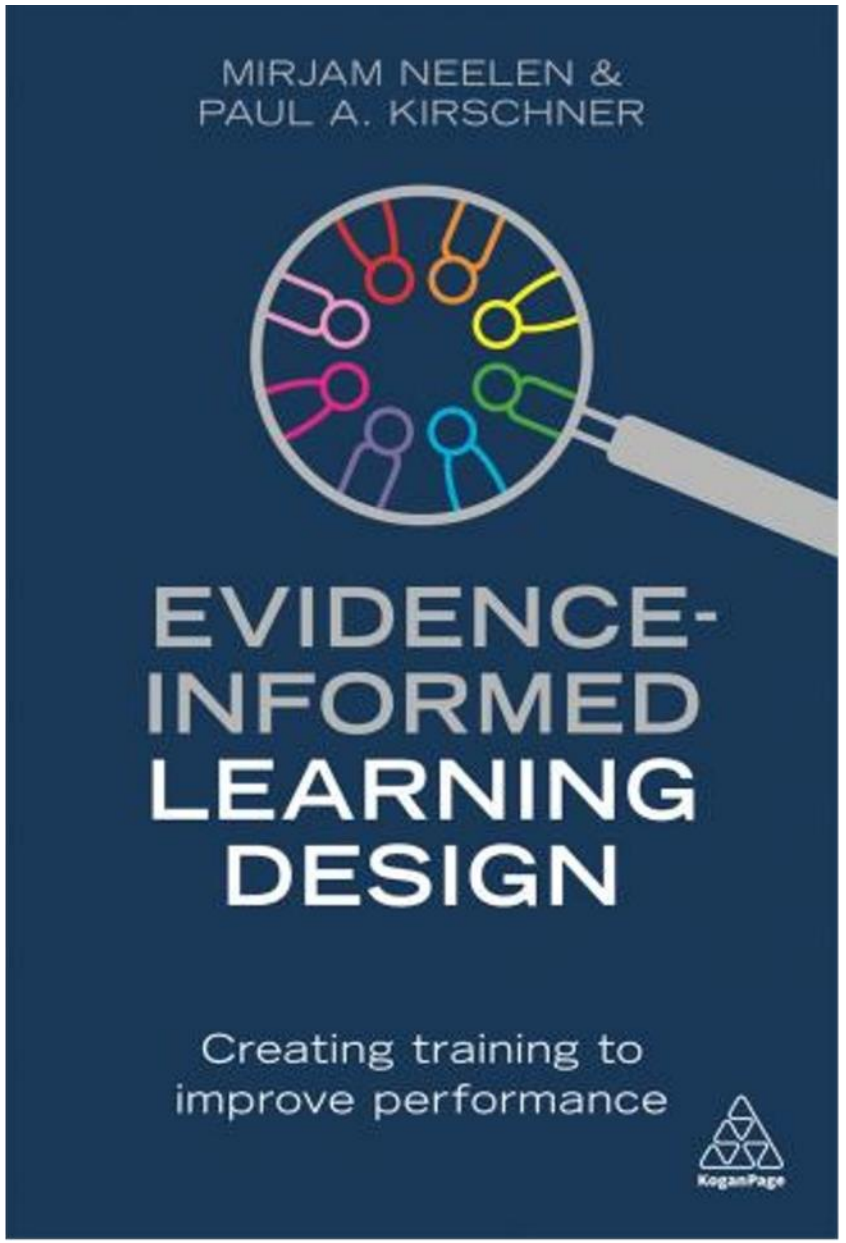
Discount: 20%

Code: EHR20



Enjoy!

REFERENCES

- Ertmer, P. A., & Newby, T. J. (1996). The expert learner: Strategic, self-regulated, and reflective. *Instructional science*, *24*(1), 1-24.
- Manjoo, F., (2008). *True Enough: Learning to live in a post-fact society.* John Wiley & Sons: Hoboken, New Jersey
- Neelen, M., & Kirschner, P. A. (2020). *Evidence-Informed Learning Design: Creating Training to Improve Performance*. Kogan Page Publishers.
- Salas, E., Tannenbaum, S. I., Kraiger, K., & Smith-Jentsch, K. A. (2012). The science of training and development in organizations: What matters in practice. *Psychological science in the public interest*, *13*(2), 74-101.
- Shank, P. (2017). Practice and Feedback for Deeper Learning. *Learning Peaks LLC*.
- Torrano Montalvo, F., & González Torres, M. (2004). Self-regulated learning: Current and future directions, Electronic journal of research in educational psychology, 2 (1), pp 1-34
- Van Merriënboer, J. J., & Kirschner, P. A. (2018). *Ten steps to complex learning: A systematic approach to four-component instructional design*. Routledge: London.
- Zimmerman, B. J. (2000). Attaining self-regulation: A social cognitive perspective. In *Handbook of self-regulation* (pp. 13-39). Academic Press.