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**Learning with collaboratively generated
graphical representations in the domain of
economics and business education**

by
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Overview

1. Introduction
2. Aims of the study
3. Method
4. Results
5. Discussion

Introduction

- **Background of the study:** Research program on the impact of learner-generated graphical representations for knowledge acquisition in the domain of economics and business education.

- **Basic assumptions:**
Learner-generated graphical representations
 - facilitate a reflective understanding of concepts and their relationships,
 - support deep and idiosyncratic elaboration of the material to be learned,
 - enhance comprehension-monitoring activities and
 - reduce working memory load by exploiting perceptual effects.

The beneficial effects of these representations can be attributed to 'modus transformation'

Introduction

Study Series

Treatment Groups	Study 1	Study 2	Study 3
Text-only Group	X		
Text + Provided-Diagram Group	X	X	X
Text + Individually Arranging Concept-Cards Group	X		
Text + Individually Generating-Maps Group	X		
Text + Map Training + Individually Generating-Maps Group		X	X
Text + Map Training + Collaboratively Generating-Maps Group			X

Aims of the study

- (1) Further investigate the application of learner-generated graphical representations in the domain of economics and business education.**
- (2) Examine whether the effectiveness of these tools can be enhanced, if they are embedded within a collaborative learning setting.**

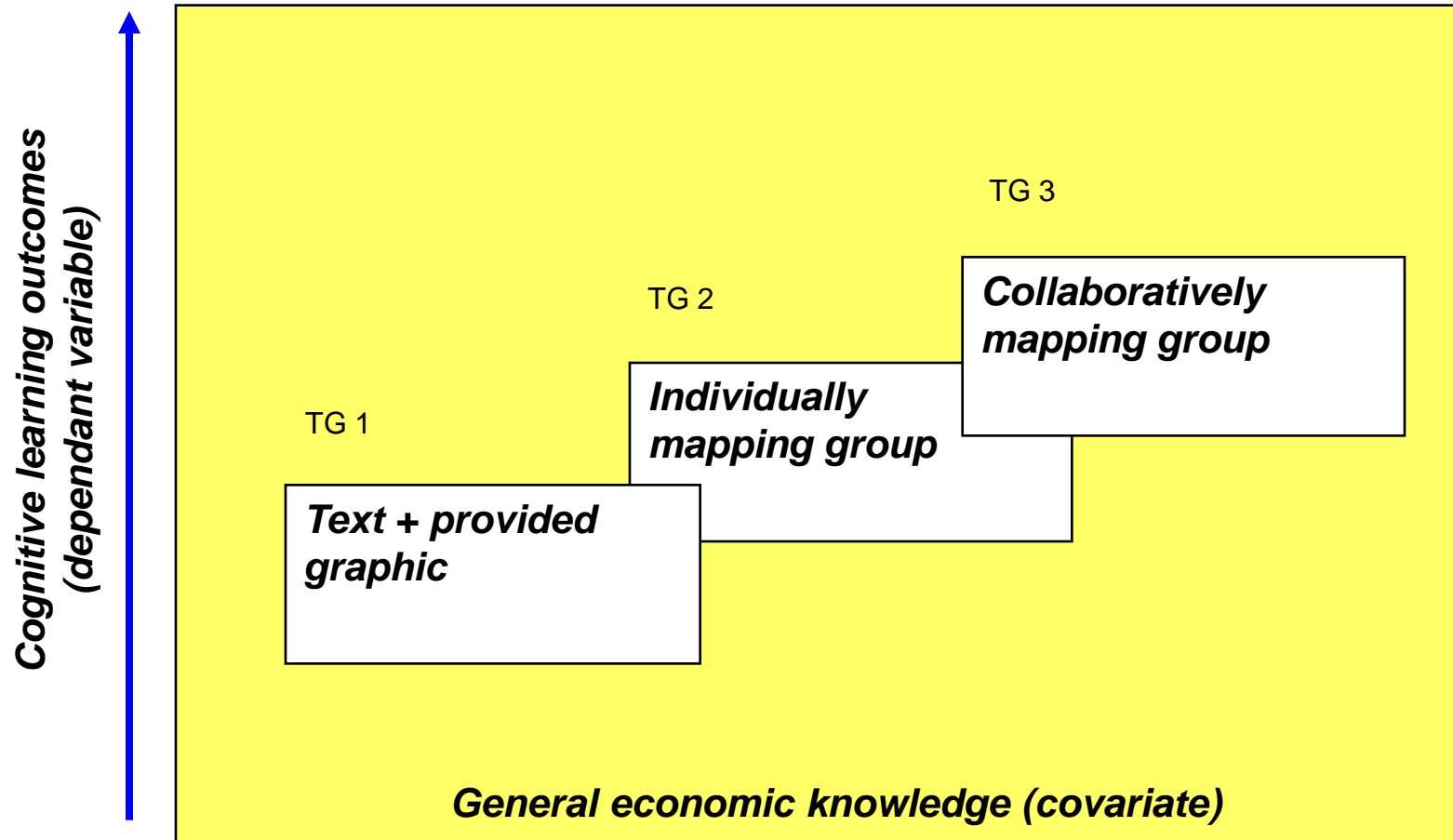
Method

Participants

- 169 students from urban business schools
- 2nd year of traineeship as bank employee (n = 78)
or as financial assistant (n = 91)
- 55 % female
- Mean age: 20 years

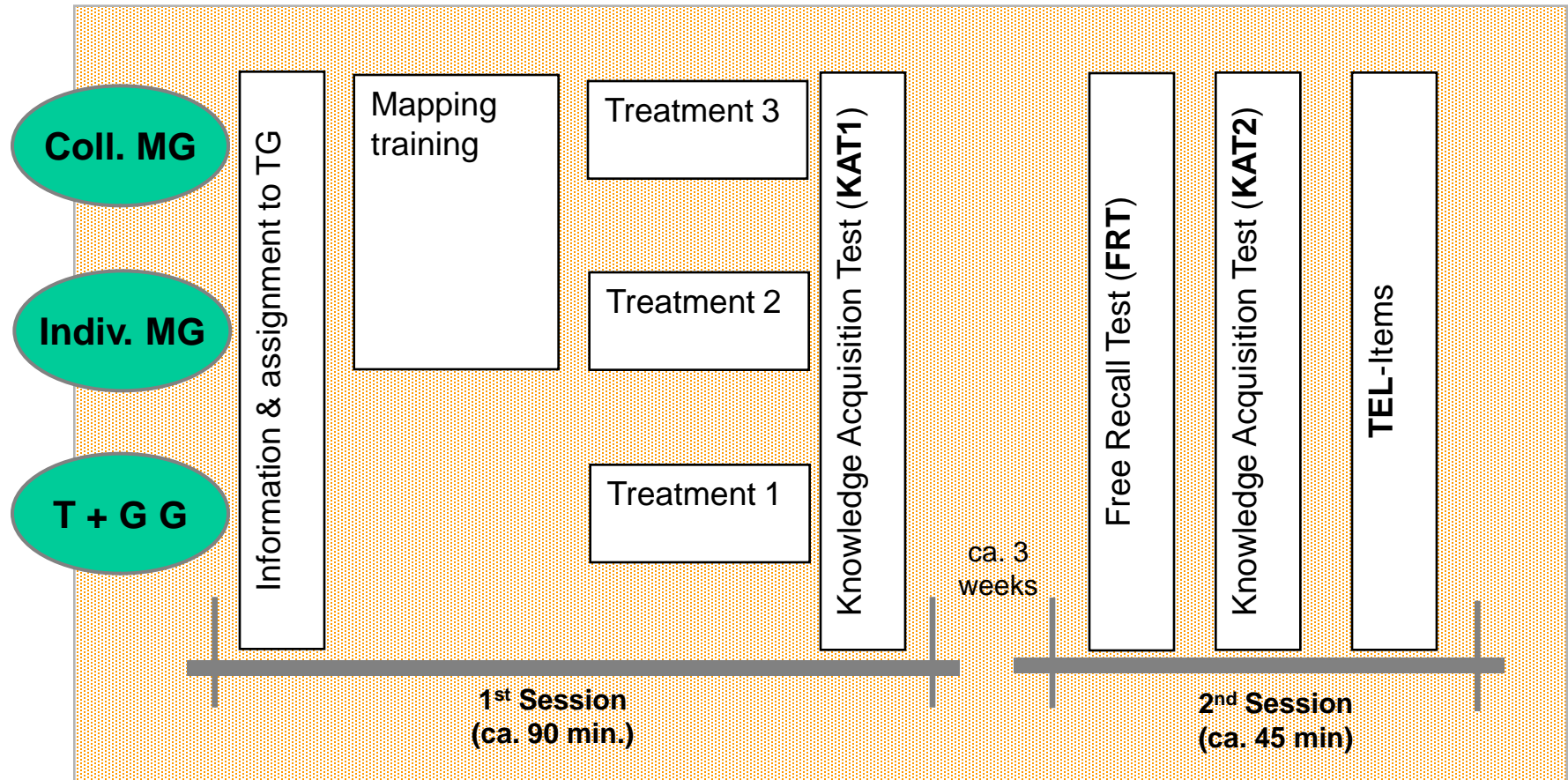
Method

Research Design



Method

Procedure and Instruments



Results

Whole sample

R ^{exp}	TG	KAT 1			KAT2			FRT			
		M ¹⁾	(SD)	R ^{emp}	M ¹⁾	(SD)	R ^{emp}	M ²⁾	(SD)	R ^{emp}	
1	Collaboratively mapping group	4,78 (n = 58)	(2,16)	2	4,08 (n = 49)	(1,91)	1	2,14 (n = 49)	(1,19)	1	s*
2	Individually mapping group	4,63 (n = 59)	(2,21)	3	3,63 (n = 51)	(2,02)	2	1,76 (n = 50)	(1,27)	2	
3	Text + graphic group	4,85 (n = 52)	(2,24)	1	3,37 (n = 46)	(1,82)	3	1,65 (n = 46)	(1,02)	3	

Tab. 1: Mean test scores, standard deviations and empirical rank orders (whole sample)

KAT = Knowledge Acquisition Test

FRT = Free Recall Test

R^{exp} = Expected rank order (according to hypotheses)

R^{emp} = Empirical rank order (according to data)

1) Note that KAT 1 and KAT 2 could take values between 0 and 9.

2) Note that FRT could take values between 0 and 5.

Results

High general economic knowledge ($TEL \geq 4$)

		KAT 1			KAT2			FRT		
R^{exp}	TG	$M^{1)}$	(SD)	R^{emp}	$M^{1)}$	(SD)	R^{emp}	$M^{2)}$	(SD)	R^{emp}
1	Collaboratively mapping group	5,20 (n = 10)	(1,99)	3 s^*	4,40 (n = 10)	(2,50)	2	2,30 (n = 10)	(1,70)	1
2	Individually mapping group	6,91 (n = 11)	(1,30)	1	4,55 (n = 11)	(1,92)	1	1,91 (n = 11)	(1,51)	3
3	Text + graphic group	5,43 (n = 7)	(1,62)	2	3,57 (n = 7)	(1,81)	3	2,00 (n = 7)	(1,29)	2

Tab. 2: Mean test scores, standard deviations and empirical rank orders (high prior economic knowledge)

KAT = Knowledge Acquisition Test

FRT = Free Recall Test

R^{exp} = Expected rank order (according to hypotheses)

R^{emp} = Empirical rank order (according to data)

¹⁾ Note that KAT 1 and KAT 2 could take values between 0 and 9.

²⁾ Note that FRT could take values between 0 and 5.

Results

Low general economic knowledge ($TEL \leq 2$)

R^{exp}	TG	KAT 1			KAT2			FRT		
		$M^{(1)}$	(SD)	R^{emp}	$M^{(1)}$	(SD)	R^{emp}	$M^{(2)}$	(SD)	R^{emp}
1	Collaboratively mapping group	4,70 (n = 27)	(2,11)	1 s^*	3,81 (n = 27)	(1,39)	1	2,07 (n = 27)	(0,92)	1 s^*
2	Individually mapping group	3,42 (n = 24)	(2,22)	3	3,21 (n = 24)	(1,98)	2	1,88 (n = 24)	(1,30)	2
3	Text + graphic group	4,00 (n = 30)	(2,32)	2	2,97 (n = 30)	(1,63)	3	1,43 (n = 30)	(0,86)	3

Tab. 3: Mean test scores, standard deviations and empirical rank orders (low prior economic knowledge)

KAT = Knowledge Acquisition Test

FRT = Free Recall Test

R^{exp} = Expected rank order (according to hypotheses)

R^{emp} = Empirical rank order (according to data)

¹⁾ Note that KAT 1 and KAT 2 could take values between 0 and 9.

²⁾ Note that FRT could take values between 0 and 5.

Discussion

- **Expected effects are partly reflected.**
- **Refined perspective on the operating conditions of learner-generated graphics might be needed.**
- **Directions for refinements are:**
 - (1) Further specification with respect to different types of knowledge and inclusion of complex outcome measures.**
 - (2) Differentiation with respect to learner characteristics and in depth analysis of the learning processes.**
- **Better curricular embedding by extending the experimental studies with a DBR approach.**

Thank you for your attention !

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