

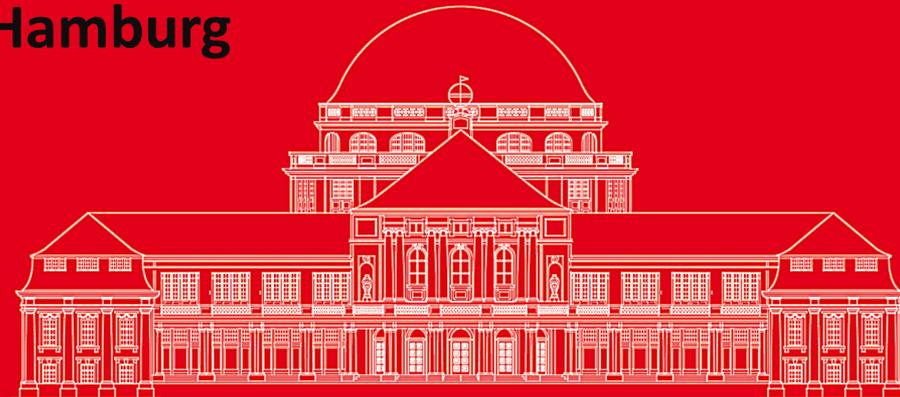


Universität Hamburg

DER FORSCHUNG | DER LEHRE | DER BILDUNG

Time on task in collaborative learning. Influence of learning goal orientation and group composition

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Overview

■ Introduction

How to measure effective learning in collaborative learning situations?

The Multimodal Video- and Audioanalysis (MuVA)

Time on task and goal orientation as research variables

■ The present study

Research questions

Procedure

Findings

■ Discussion and further implications

Collaborative learning

- Learning in situations in which the teacher is **not constantly present**
 - High amount of **self-directed learning strategies** necessary, e. g. problem-analysis, search for solutions, evaluation of solutions, implementation etc.
 - **Peer-to-peer learning** as predominant social form
- ⇒ *Peer-influences in collaborative learning not extensively researched yet*



The challenge

How to document and analyse learning in open, collaborative learning situations, with a focus on **peer-to-peer interaction**?

Multimodal Video- and Audioanalysis (MuVA)

(Knigge et al. 2013; Siemon et al. 2015)

- Videotaping through **multiple cameras** in the classroom
- Individualized audiotaping of verbal utterances through **portable micro-recorders**
- Combination of sources for analysis via Adobe PremierePro



⇒ *analysis of peer-to-peer behaviour on the micro-level*

Arbeitsbereich: Bearbeitung

Projekt: 14-07-10Tag2AmandaBearb

Multi-Kamera

14-07-10Tag2AmandaBearb.prproj 4 Elemente

Name	Kennzeichnung	Framerate
00186.MTS		2
00187.MTS		2
MOV002.MOD		2
Sequenz 01		2

00:26:09:12

01:26:21:23

00:00 00:05:00:00 00:10:00:00 00:15:00:00 00:20:00:00 00:25:00:00 00:30:00:00 00:35:00:00 00:40:00:00 00:45:00:00 00:50:00:00 00:55:00:00 01:00:00:00 01:05:00:00 01:10:00:00 01:15:00:00 01:20:00:00 01:25:00:00

Sequenz 01

00:26:09:12

00:24:15:00 00:24:30:00 00:24:45:00 00:25:00:00 00:25:15:00 00:25:30:00 00:25:45:00 00:26:00:00 00:26:15:00 00:26:30:00 00:26:45:00 00:27:00:00 00:27:15:00 00:27:30:00 00:27:45:00 00:28:00:00 00:28:15:00 00:28:30:00 00:28:45:00

Video 3

Video 2 00186.MTS [V]

Video 1 MOV002.MOD [V] Deckkraft:Deckkraft

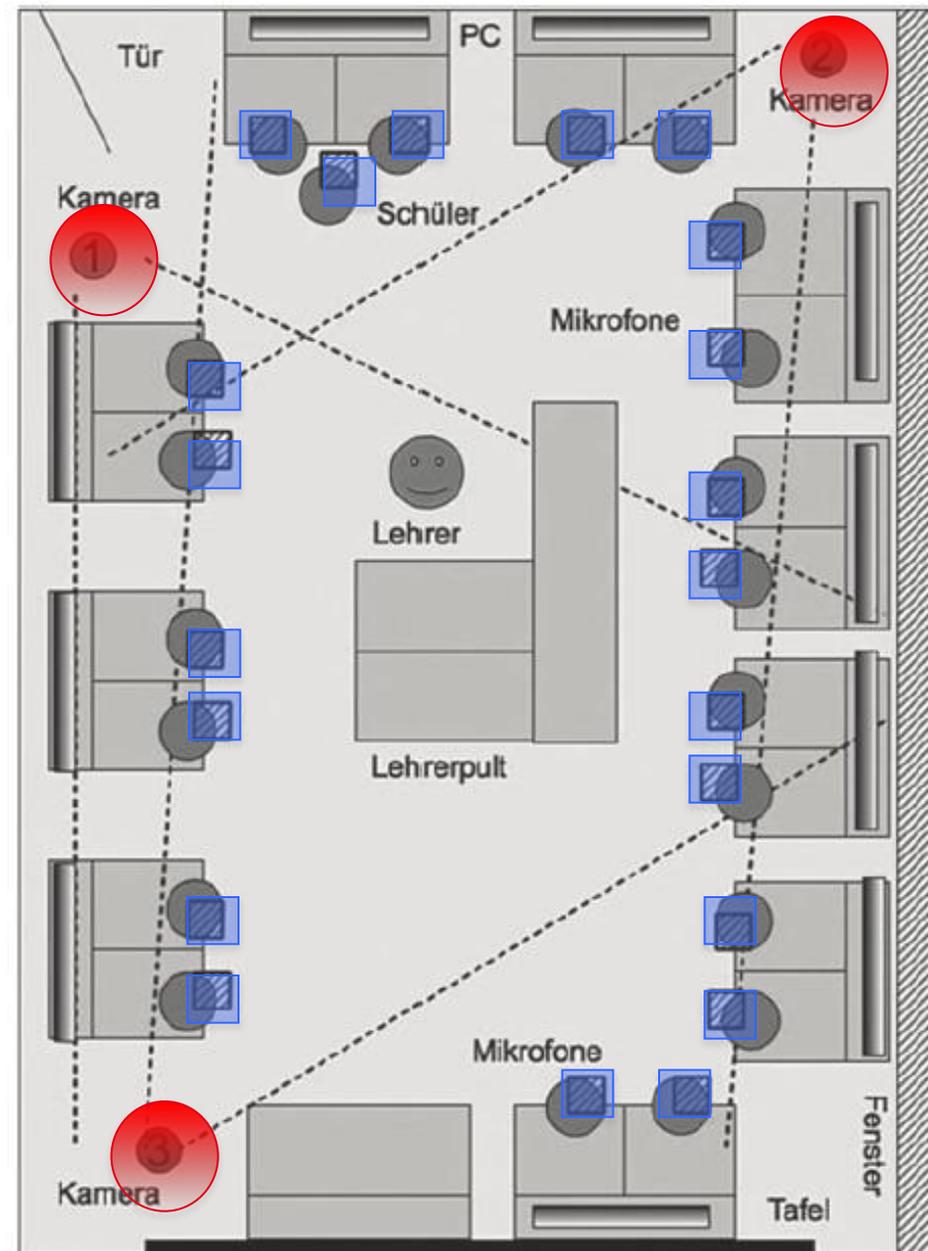
Audio 1 MOV002.MOD [A] Lautstärke:Pegel

Audio 2 00186.MTS [A] Lautstärke:Pegel

The dataset

(cf. Knigge et al. 2013a, b)

- **N=59** students in a vocational education program (accounting and logistics)
- worked in **dyads**
- Simulation-based, computer-supported collaborative assignment (*logistic:challenge*, Siemon et al. 2012)
- Per class: 8 hours/class recorded with MuVA (total **24 hours recorded material**)



Time on Task (TT)

- **Time spent working effectively and successfully** on a given assignment (cf. Anderson 1995, Bordhagen & Gettinger 2012)
- Effective predictor of **academic performance** (cf. van Gog 2012)

TT in collaborative learning

- Decreased amount of **direct control** through the teacher (cf. Lipowsky 2006)
- Interest into factors that influence students' time on task **when teacher is not present**

Goal orientation (GO)

- Motivational disposition to **orient ones efforts**
- **Substantial influence on the time on task** is assumed (van Gog 2012)

Goal orientation in collaborative learning:

- Not only a students goal orientation has to be considered, but also the **learning partner's goal orientation** (Knigge, Siemon, Nordstrand, & Stolp, 2013).

Research questions

- How does the **goal orientation of a student** influence his or her time on task in the open phases of collaborative simulation-based learning?
- How does the **goal orientation of the learning partner** influence the time on task of a student in the open phases of collaborative simulation-based learning?
- How does the **similarity of the goal orientations between a student and his/her learning partner** in a dyad relate to the time on task in the open phases of collaborative simulation-based learning?

Procedure 1

- Coding of the collaborative phases in the dataset with the a specially developed **coding-manual 'Time on Task (TT)'**
- Per student/class: **two independent raters**
 - trained before coding
 - not allowed to discuss decisions while coding
- Analysis of **inter- and intra-rater agreement**

Coding manual TT

Time-sampling, **10-sec. intervals**

Coding of 4 aspects:

Focus on/off topic	Subject of conversation	Activity of student	Social form of interaction
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Low-inference rating:

“The aspect is...”

present not present

Coding manual TT

Time-sampling, **10-sec. intervals**

Coding of 4 aspects:

Focus on/off topic	Subject of conversation	Activity of student	Social form of interaction
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Low-inference rating:

“The aspect is...”

present not present

Inter-rater-agreement (Cohen ‘s κ)

.83 $\leq \kappa \leq$.89	.63 $\leq \kappa \leq$.80	.59 $\leq \kappa \leq$.74	.68 $\leq \kappa \leq$.78
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Intra-rater agreement (Cohen ‘s κ)

.83 $\leq \kappa \leq$.84	.75 $\leq \kappa \leq$.80	.63 $\leq \kappa \leq$.75	.69 $\leq \kappa \leq$.83
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Procedure 2

Survey of goal orientations with the **SELLMO-Scales** (Spinath et al., 2002)

Four scales:

- *Learning Goal Orientation (LG)*: Pursuit to **extend one's competence**
- *Achievement Goal Orientation (AG)*: Pursuit to **demonstrate one's competence**
- *Performance Avoidance Orientation (PA)*: Pursuit to **hide one's own (alleged) incompetence**
- *Work Avoidance*: Pursuit to **avoid effort**

Procedure 3

- RQs 1 & 2: Computation of hierarchical regression models
 - **Step 1:** SELLMO-scales, student's values
 - **Step 2:** SELLMO-scales, student's values + learning partner's values
 - Relative amount of on-topic behaviour (aspect "focus" from TT manual) as dependent variable

- RQ 3: Correlation analysis
 - Variable 1:** Differences on goal orientations measurement values between a student and his/her learning partner
 - Variable 2:** Relative amount of on-topic behaviour

Findings (RQs 1 & 2)

Step 1 *Student's values*

	Effekt
LG _{Person}	
AG _{Person}	-
PA _{Person}	+
WA _{Person}	
$R^2 = .33$	

Step 2 *Student's values & learning partner's values*

	Effekt		Effekt
LG _{Person}		LG _{Partner}	+
AG _{Person}	-	AG _{Partner}	-
PA _{Person}	+	PA _{Partner}	+
WA _{Person}	-	WA _{Partner}	-
$R^2 = .65$			

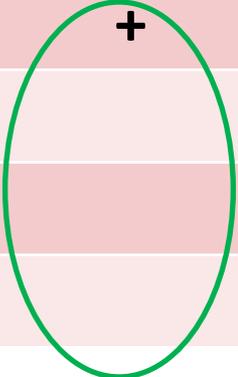
Dependent variable: *Relative amount of on-topic behaviour*

LG= Learning goal orientation; AG = Achievement goal orientation;
PA = Performance goal orientation; WA = Work avoidance orientation

$$R^2_{Modell\ 2} > R^2_{Modell\ 1}$$

Findings (RQ 3)

	TT
LG_Diff	+
AG_Diff	
PA_Diff	
WA_Diff	



Interpretation

The more similar a student and his/her learning partner are with respect to their learning goal motivation, the higher is this student's amount of on-topic behaviour

$p(r) < .05$; correlation presented only if $r > .30$

DIFF: *Difference in measure for goal orientation*

TT: *Relative amount of on-topic behaviour*

LG= Learning goal orientation; AG = Achievement goal orientation;

PA = Performance goal orientation; WA = Work avoidance orientation

Discussion I

- Both student's and learning partner's goal orientation **predict time on task**
- ⇒ Influences congruent with goal orientation theory & previous findings
- ⇒ Explanatory value added through inclusion of partner values is high!

Discussion II

- **Specific influence of learning goal orientation** on time on task in collaborative learning situations

- ⇒ It is not important, whether a student is highly learning goal oriented himself/herself – what is important is...
 - a) To have a highly learning goal oriented partner
 - b) To be similar to him/her in your own learning goal orientation

Implications

- ✓ Empirically: Learning partners must be included in analysis of collaborative learning
- ✓ Practically: Teachers and educators should pay attention to group composition aspects
- ✓ Methodologically: MuVA as reliable instrument should be used for analysis of collaborative learning



Thank you for your attention 😊

Siemon, J., Scholkmann, A., & Boom, K.-D. (2015, Oktober 9). Time on Task in Collaborative Learning. Influence of Learning Goal Orientation and Group Composition. Paper presented at the ECER/Budapest.





Coding Scheme TT

Focus	Subject	Activity	Social form	Examples
on topic [2]	Learning time [3]	Active [2]	Alone/silent [4]	Works silently on PC or with paper and pencil; conversations with oneself, mumbling etc.
			In conversation with learning partner(s) [3]	Talks with the learning partner(s) about the task at hand
			In conversation with teacher [2]	Poses questions towards the teacher/talks with the teacher about the task at hand
			In conversation with other group [1]	Talks with another group of learners (not learning partners(s) only), asks for help
		Passive [1]	Alone/silent [4]	Watches/listens to video (as introduction of the learning sequence), watches the learning partner(s) and engages in reflections; conversations with oneself, mumbling etc.
			In conversation with learning partner(s) [3]	Listens to the learning partner(s), who talk(s) about the topic at hand
			In conversation with teacher [2]	Listens to the teacher, who talks about the topic at hand
			In conversation with other group [1]	Listens to another group of learners, who talk about the topic at hand
	Organisation of the learning process [2]	Active [2]	Alone/silent [4]	Reads instructions
			In conversation with learning partner(s) [3]	Talks with the learning partner(s) about the organization of the learning process
			In conversation with teacher [2]	Asks questions/talks with the teacher about the organization of the learning process
			In conversation with other group [1]	Talks with another group of learners about the organization of the learning process
		Passive [1]	Alone/silent [4]	Waits for the PC to boot ("please wait" sing on the screen)
			In conversation with learning partner(s) [3]	Listens to the learning partner(s), who talks about the organization of the learning process
Off topic [1]	Private [1]	Active [2]	Alone/silent [4]	Plays with mobile etc.
			In conversation with learning partner(s) [3]	Talks with the learning partner(s) about private matters
			In conversation with teacher [2]	Talks with the teacher about private matters
			In conversation with other group [1]	Talks with another group of learners about private matters
	Passive [1]	Alone/silent [4]	Is not involved in the learning process at all, only with him-/herself: bounces on the chair, sings to him-/herself	
		In conversation with learning partner(s) [3]	Listens to the learning partner(s)	
		In conversation with teacher [2]	Listens to the teacher	
		In conversation with other group [1]	Listens to another group	
Unclear [0]	Unclear [0]	Unclear [0]	Unclear [0]	Unclear; also: to many code-switches within on coding interval

Authentic marker: 2,3,2,3

Predictor	ΔR^2	<i>Beta</i>	<i>SE_b</i>	<i>p</i>
Step 1	.33			.001
LG		.21	.02	.166
AG		-.63	.02	.000
PA		.51	.02	.001
WA		-.25	.02	.079
Step 2	.32			.000
LG		.23	.01	.062
AG		-.74	.02	.000
PA		.58	.01	.000
WA		-.37	.01	.004
LG partner		.32	.02	.013
AG partner		-.26	.02	.038
PA partner		.33	.01	.007
WA partner		-.46	.01	.000
Total <i>R</i> ²	.65			

LG=learning goal orientation; AG=achievement goal orientation; PA=performance avoidance orientation; WA=work avoidance orientation; $p < .05$ **bold**

	<i>r</i>	<i>p</i>
LG_Diff_B	-.35	.009
PG_Diff_B	-.24	.052
PA_Diff_B	-.10	.246
WA_Diff_B	-.00	.489

LG_Diff_B=difference for learning goal orientation; PG_Diff_B=difference for performance goal orientation; PA_Diff_B=difference for performance avoidance orientation; WA_Diff_B=difference for work avoidance orientation

Model diagnostics

Normal distribution of residues ✓

- Since $N > 30 \Rightarrow$ Central Limit Theorem for both models
- Visual inspection & Shapiro-Wilk Test (n.s.)

Multicollinearity ✓

- $VIF_{Max} = 1,89 < 10$; $T_{Min} = 0,52 > 0,2$

Homoscedasticity ✓

- Test after Glejser:
 - $|Res| = \beta_0 + \beta_i x \rightarrow \beta_i = n.s.$
 - $|Res| = \beta_0 + \beta_i \sqrt{x} \rightarrow \beta_i = n.s.$
 - $|Res| = \beta_0 + \beta_i 1/x \rightarrow \beta_i = n.s.$
- Visual inspection

Conclusion:

Regression coefficients and & SD have been estimated unbiased