


# Selbststudium braucht Selbstregulation!

## Fördermöglichkeiten in der Hochschullehre

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# Überblick

Wie lernen Studierende?

Was ist selbstreguliertes Lernen?

Wie kann selbstreguliertes Lernen gefördert werden?

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# Zeitinvestment im Studium

**Erwartetes Zeitinvestment im Studium**:
40h/Woche (Europäische Union, 2015)

**Was schätzen Sie?**

Wie viel Stunden pro Woche investieren Studierende im Durchschnitt für ihr Studium (Präsenzveranstaltungen + Selbststudium)?

# Wie lernen Studierende?

## Zeitinvestment: Semesterverlauf

**Liborius, Bellhäuser & Schmitz (2019)**
**Stichprobe: N=105**
Geschlecht: 39 w, 66 m
Alter: M=22,3 Jahre (SD=2,8)
Semester: M= 4,4 (SD=2,7)

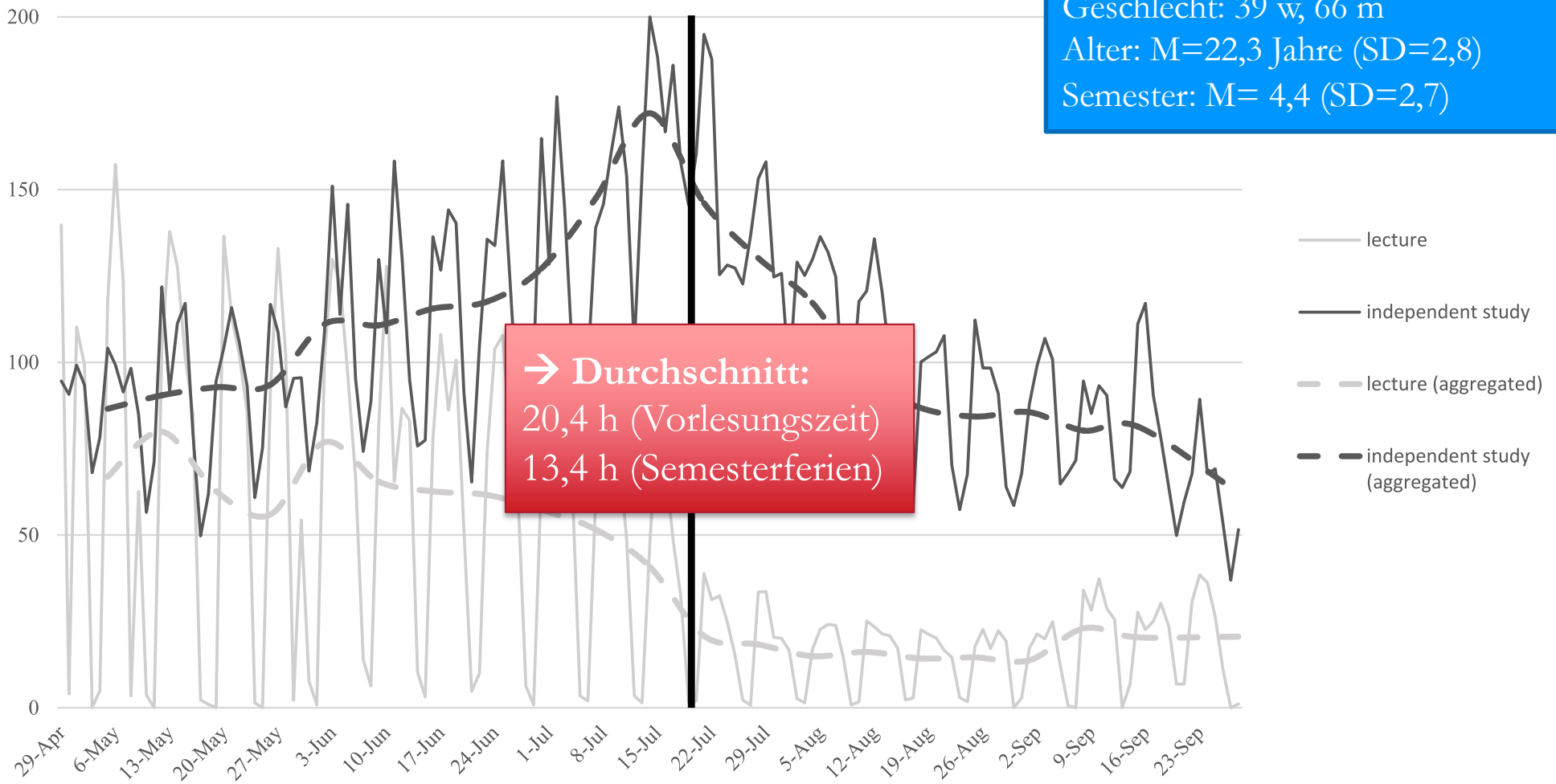



**Fig. 3.** Students lecture- and independent time investment (solid lines) and average lecture- and independent study time investment (dashed lines) aggregated for weeks 1 to 22 (in minutes). The plumb line indicates the begin of the exam period.

# Zeitinvestment: Wochentage

**Liborius, Bellhäuser & Schmitz (2019)**
**Stichprobe: N=105**
Geschlecht: 39 w, 66 m
Alter: M=22,3 Jahre (SD=2,8)
Semester: M= 4,4 (SD=2,7)

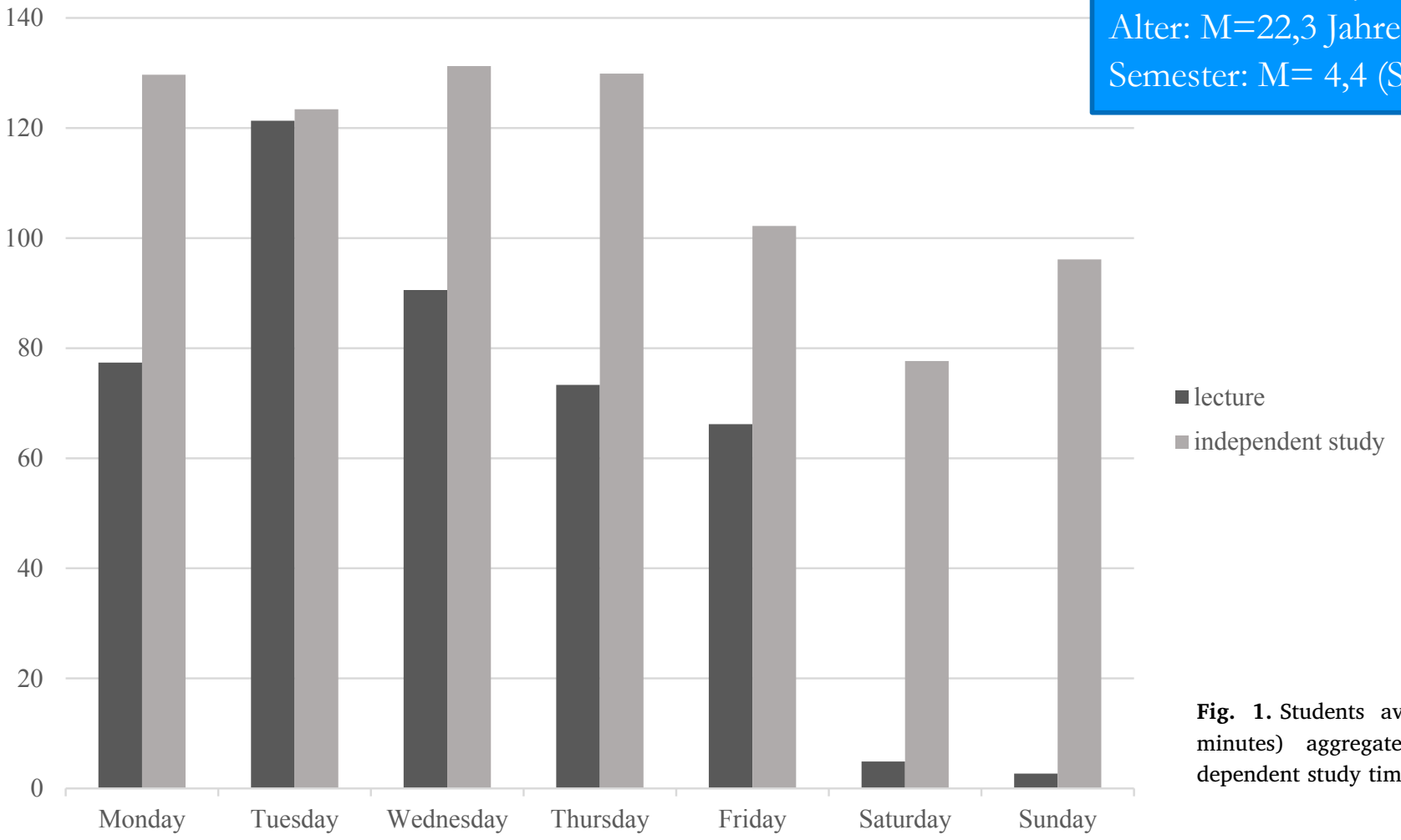



**Fig. 1.** Students average time investment (in minutes) aggregated over lecture- and independent study time within the lecture period.

# Zeitinvestment und Studienleistung

- N=424 Studierende
- Logfiles von Lernplattform

**Theobald, Bellhäuser & Imhof (2019)**
**Stichprobe: N=424**
Geschlecht: 253 w, 171 m

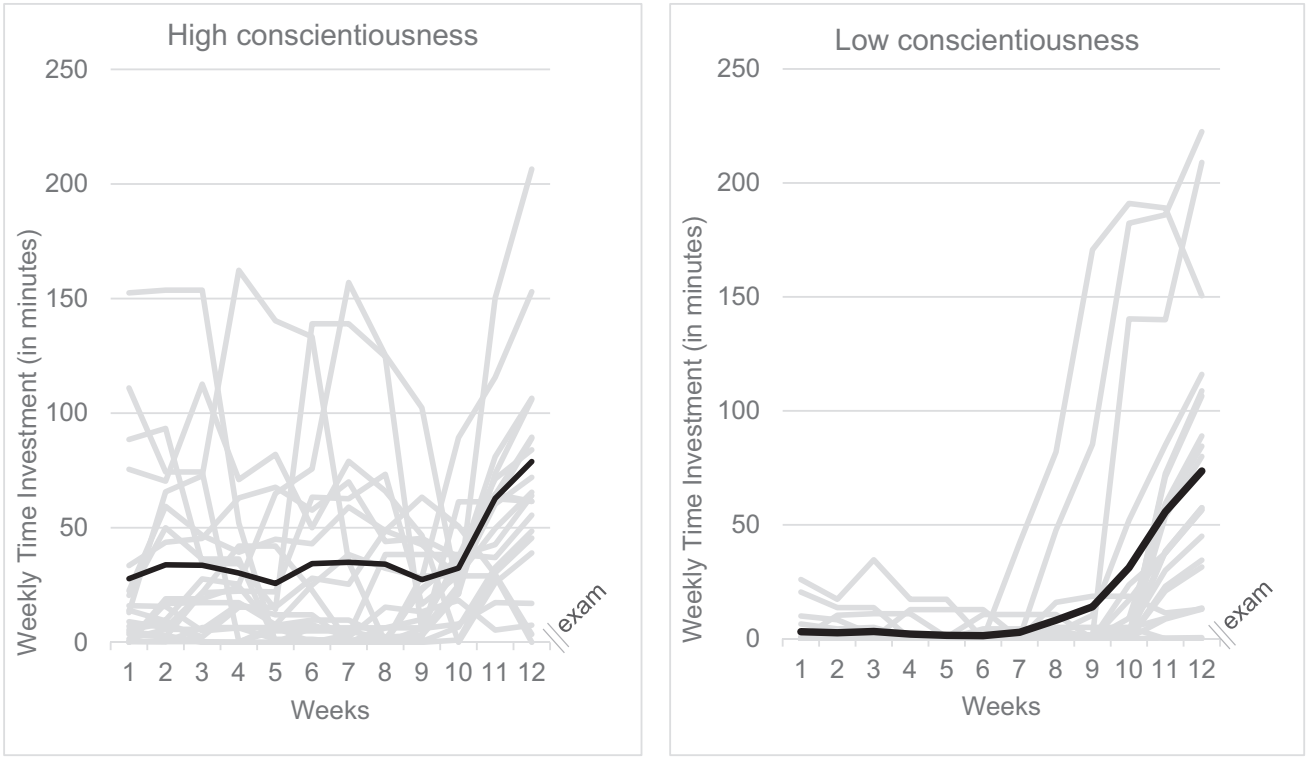



**Fig. 3.** Individual (grey) and average (black) weekly time investment in minutes for low ($n$ = 21, 10th percentile) and high conscientious ($n$ = 21, 90th percentile) students. *Note*. We computed moving averages of weekly time investment for every week $t_w$ using the time investment in the respective preceding ($t_{w-1}$) and subsequent week ($t_{w+1}$).

# Wie lernen Studierende?

## Zeitinvestment

durchschnittlich 20,4h (Vorlesungszeit) bzw. 13,4h (Semesterferien)

dennoch: weitverbreitetes Gefühl der Überforderung

Besuch von Lehrveranstaltungen nimmt linear ab über die Vorlesungszeit

Selbststudium nimmt linear zu über die Vorlesungszeit

## Studienleistung

Absolutes Zeitinvestment nicht unbedingt entscheidend für Leistung

Großer Einfluss von verteiltem Lernen auf Leistung

# Überblick

Wie lernen Studierende?

Was ist selbstreguliertes Lernen?

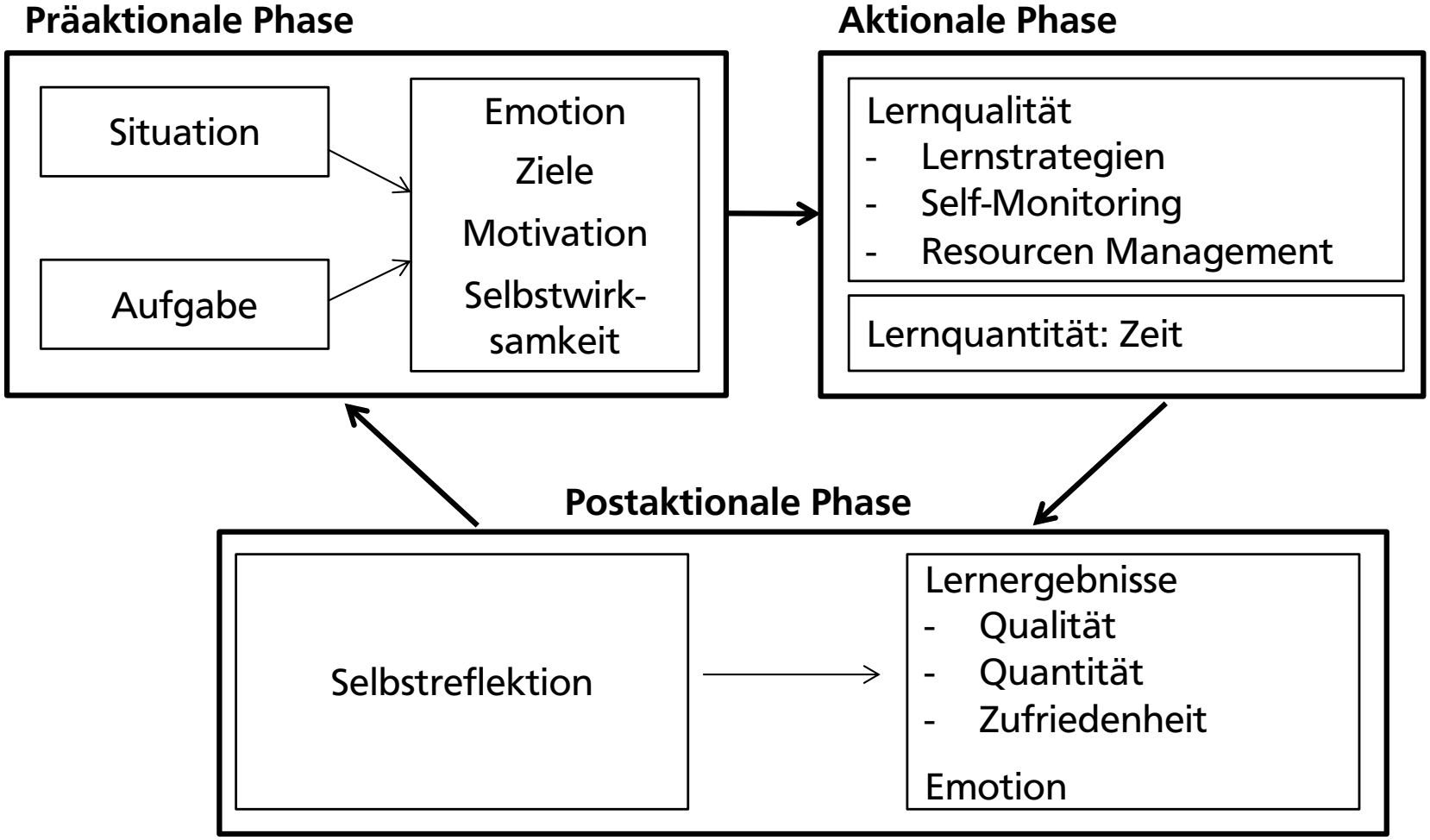
Wie kann selbstreguliertes Lernen gefördert werden?

# Definition: Selbstreguliertes Lernen (SRL)

> *...processes whereby learners personally activate and sustain cognitions, affects, and behaviors that are systematically oriented toward the attainment of personal goals.*
>
> (Zimmerman & Schunk, 2011)

# Prozessmodell des selbstregulierten Lernens

## Schmitz & Wiese (2006)



# Einfluss von SRL auf akademische Leistungen

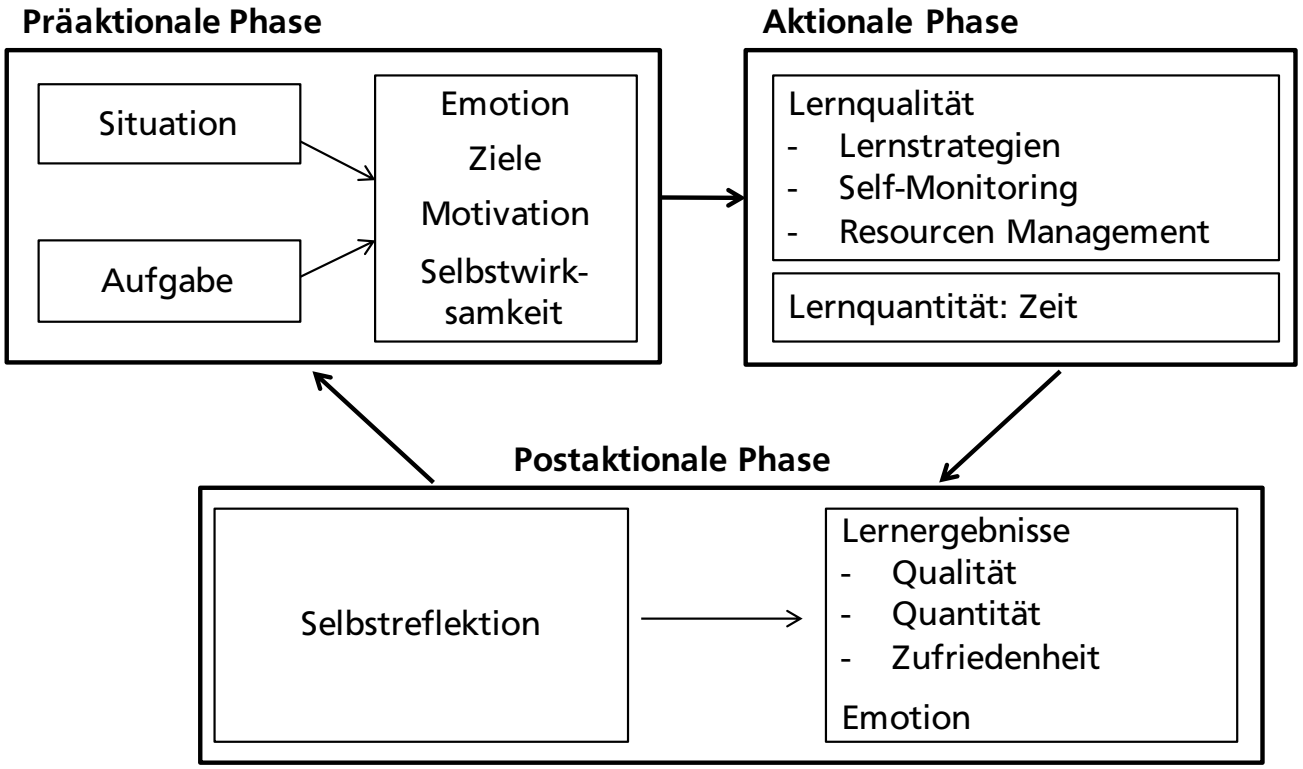
**Metaanalyse**

*Psychological Correlates of University Students' Academic Performance*

Richardson, Abraham & Bond, 2012

| Maß | r | CI (95%) | N | k |
|---|---|---|---|---|
| Abschlussnote Schule | .40 | [.35, .45] | 34.724 | 46 |
| Intelligenz | .20 | [.16, .24] | 7.820 | 35 |
| Gewissenhaftigkeit | .19 | [.17, .22] | 27.875 | 69 |
| Offenheit | .09 | [.06, .12] | 23.096 | 52 |
| Neurotizismus | -.01 | [-.04, .01] | 23.659 | 58 |
| Verträglichkeit | .07 | [.04, .09] | 21.734 | 47 |
| Extraversion | -.04 | [-.07, -.02] | 23.730 | 58 |
| Selbstwirksamkeitserwartung | .31 | [.28, .34] | 46.570 | 67 |
| Intrinsische Motivation | .17 | [.12, .23] | 7.414 | 22 |
| Zielsetzung | .35 | [.28, .42] | 2.670 | 13 |
| Elaboration | .18 | [.11, .24] | 8.006 | 12 |
| Metakognition | .18 | [.10, .26] | 6.205 | 9 |
| Anstrengungsregulation | .32 | [.29, .35] | 8.862 | 19 |
| Hilfesuchen | .15 | [.08, .21] | 2.057 | 8 |

# Einfluss von SRL auf akademische Leistungen




| Maß | r |
|---|---|
| Abschlussnote Schule | .40 |
| Intelligenz | .20 |
| Gewissenhaftigkeit | .19 |
| Offenheit | .09 |
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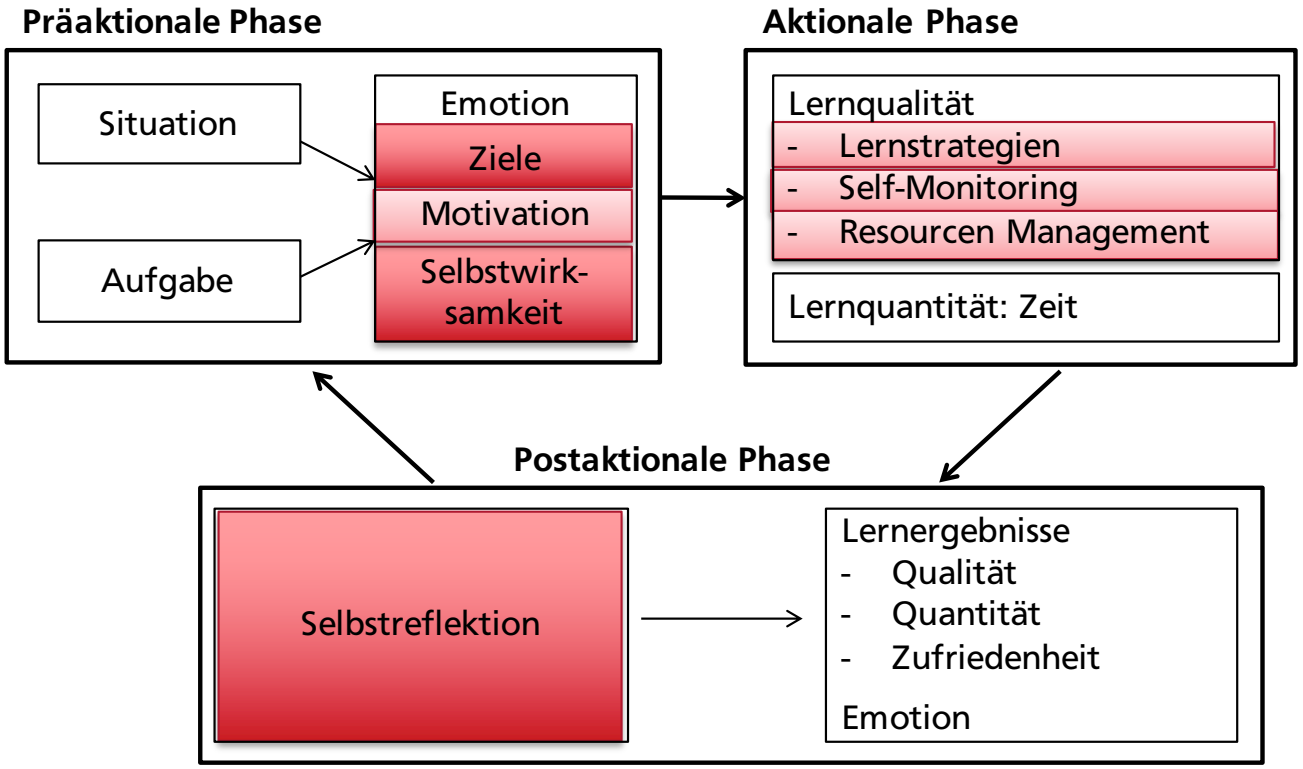
# Einfluss von SRL auf akademische Leistungen




| Maß | r | C |
|---|---|---|
| Abschlussnote Schule | .40 | [ |
| Intelligenz | .20 | [ |
| Gewissenhaftigkeit | .19 | [ |
| Offenheit | .09 | [ |
| Neurotizismus | -.01 | [- |
| Verträglichkeit | .07 | [ |
| Extraversion | -.04 | [- |
| Selbstwirksamkeitserwartung | .31 | [ |
| Intrinsische Motivation | .17 | [ |
| Zielsetzung | .35 | [ |
| Elaboration | .18 | [ |
| Metakognition | .18 | [ |
| Anstrengungsregulation | .32 | [ |
| Hilfesuchen | .15 | [ |

# Selbstreguliertes Lernen

Lernen wird als Prozess betrachtet, der auch Vor- und Nachbereitung umfasst.

Selbstregulierte Lerner sind erfolgreicher in der (Hoch-)Schule durch:

- Besseres Verständnis der Inhalte
- Effizienteres Lernverhalten
- systematisches, eigenverantwortliches und zielgerichtetes Lernen

Sie erreichen dadurch bessere Leistungen und sind zufriedener.
Selbstreguliertes Lernen ist die Voraussetzung für lebenslanges Lernen.

# Überblick

Wie lernen Studierende?

Was ist selbstreguliertes Lernen?

Wie kann selbstreguliertes Lernen gefördert werden?

# Interventionen zur Förderung von SRL

## Selbstreguliertes Lernen kann gefördert werden

(Benz, 2010; Dignath & Büttner, 2008)

1) Trainingsinterventionen (Schmitz & Wiese, 2006)
2) Web-basiertes Training (Bellhäuser et al., 2016)
3) Lerntagebücher (Theobald, Dignath & Bellhäuser, under review)
4) Learning Analytics & Prompting (Bannert & Reimann, 2011)
5) Einsatz digitaler Medien (Tamim et al., 2011)

# 1) Trainingsinterventionen

Ziele setzen

Planen

Selbst-motivation

Volition

Kognitive Lern-strategien

Reflexion

# 1) Trainingsinterventionen


- Eigene Zielesetzung vergegenwärtigen
  - Langfristige Ziele
  - Kurzfristige Ziele
- SMARTe Ziele
  - Spezifisch
  - Messbar
  - Anspruchsvoll
  - Realistisch
  - Terminiert

# 1) Trainingsinterventionen


- Überblick über Aufgaben verschaffen
- Prioritäten setzen
- Teilschritte planen
- Feste Zeiten definieren
- Verteiltes Lernen
- Pausen einplanen

# 1) Trainingsinterventionen


- Intrinsische vs. extrinsische Motivation
- Schlaf
- Körperliche Aktivität
- Soziale Kontakte
- Erfolgserlebnisse
- Interesse
- Einstellung

# 1) Trainingsinterventionen

Volition

- Störquellen vorab ausschalten
- Arbeitsmaterialien bereitlegen
- Gewohnheiten / Rituale
- Leicht anfangen
- Durchhaltewillen trainieren

# 1) Trainingsinterventionen

Kognitive Lern-strategien

- Strukturieren
- Elaborieren
- Zusammenfassen
- Wiederholen

# 1) Trainingsinterventionen

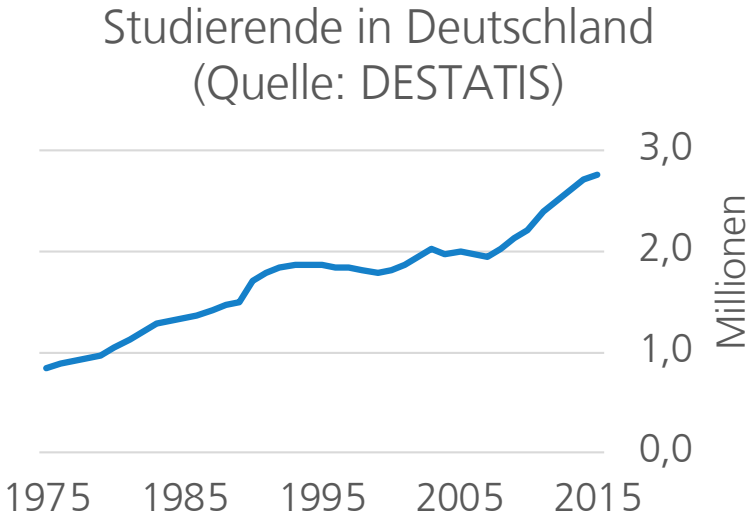
Reflexion

- Attribution / Ursachenzuschreibung
  - Internal vs. external
  - Stabil vs. variabel
- Bezugsnormorientierung
  - Soziale Bezugsnorm
  - Individuelle Bezugsnorm
  - Kriteriale Bezugsnorm

# 2) Web-basiertes Training (WBT)

## Effektivität vs. Effizienz

Zunehmende Studierendenzahlen

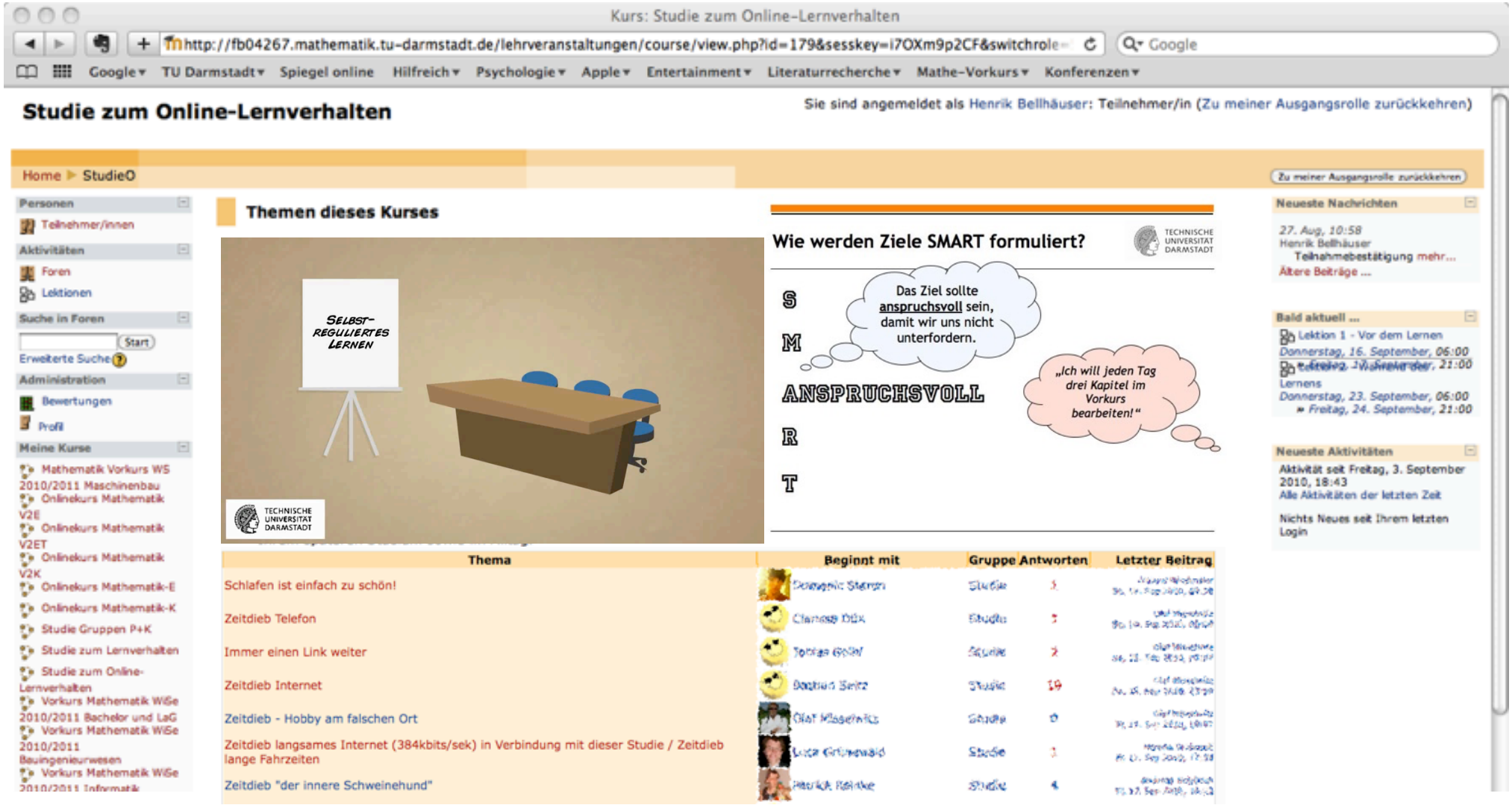



## Hypermediale Lernumgebung im World Wide Web

Metaanalytischer Vergleich mit Classroom Instruction (CI):
(Sitzman, Kraiger, Steward & Wisher, 2006)

- WBT effektiver für deklaratives Wissen
- WBT und CI gleichermaßen effektiv für prozedurales Wissen

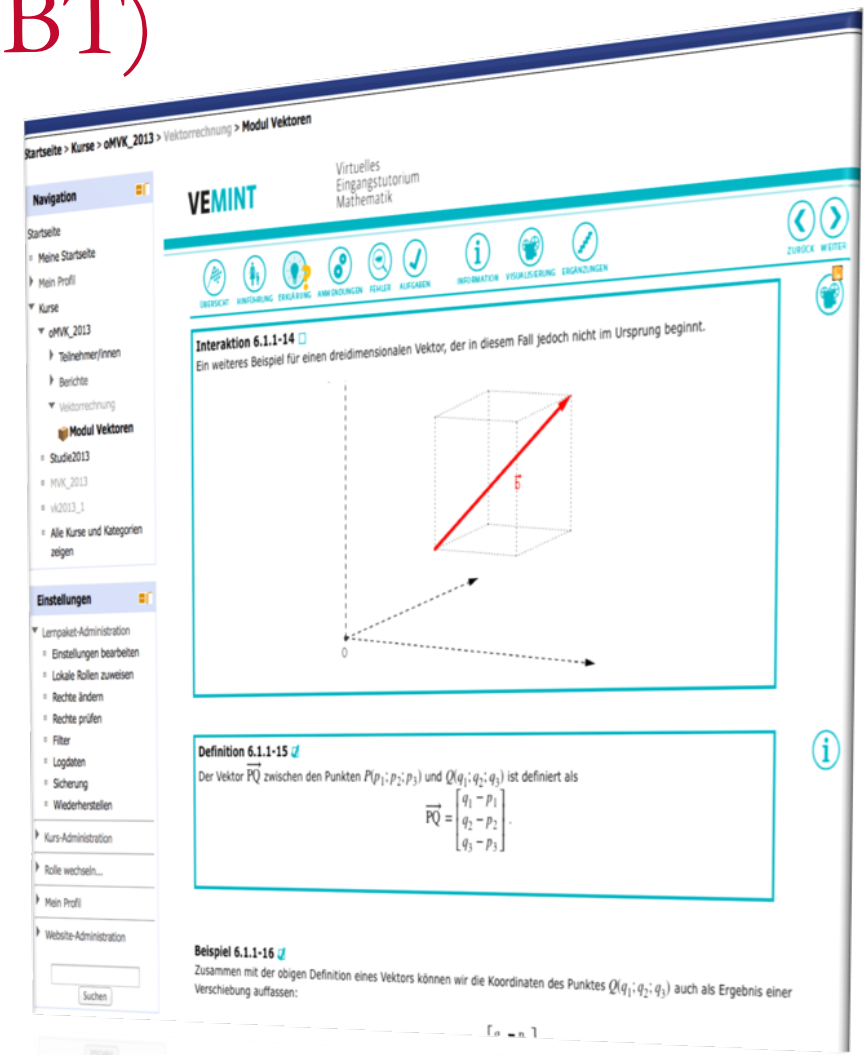
# 2) Web-basiertes Training (WBT)



# 2) Web-basiertes Training (WBT)

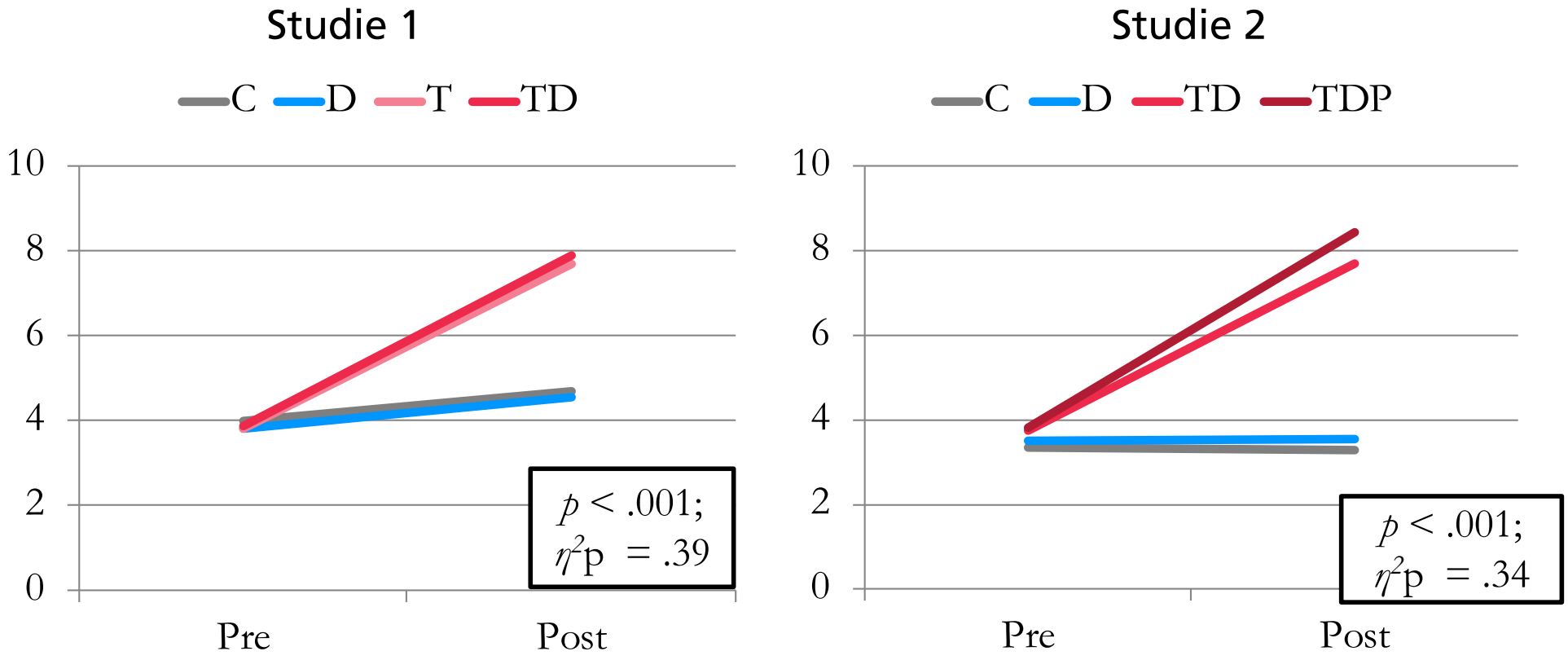
## Ursprüngliches Einsatz-Szenario: Vorkurs Mathematik (TU Darmstadt)

- Vorbereitung auf mathematikhaltiges Studium (Maschinenbau, Informatik, Bauingenieurwesen & Mathematik)
- ca. 50 Kapitel
- 4 Wochen vor Vorlesungsbeginn
- Online-Kurs (Plattform: Moodle)



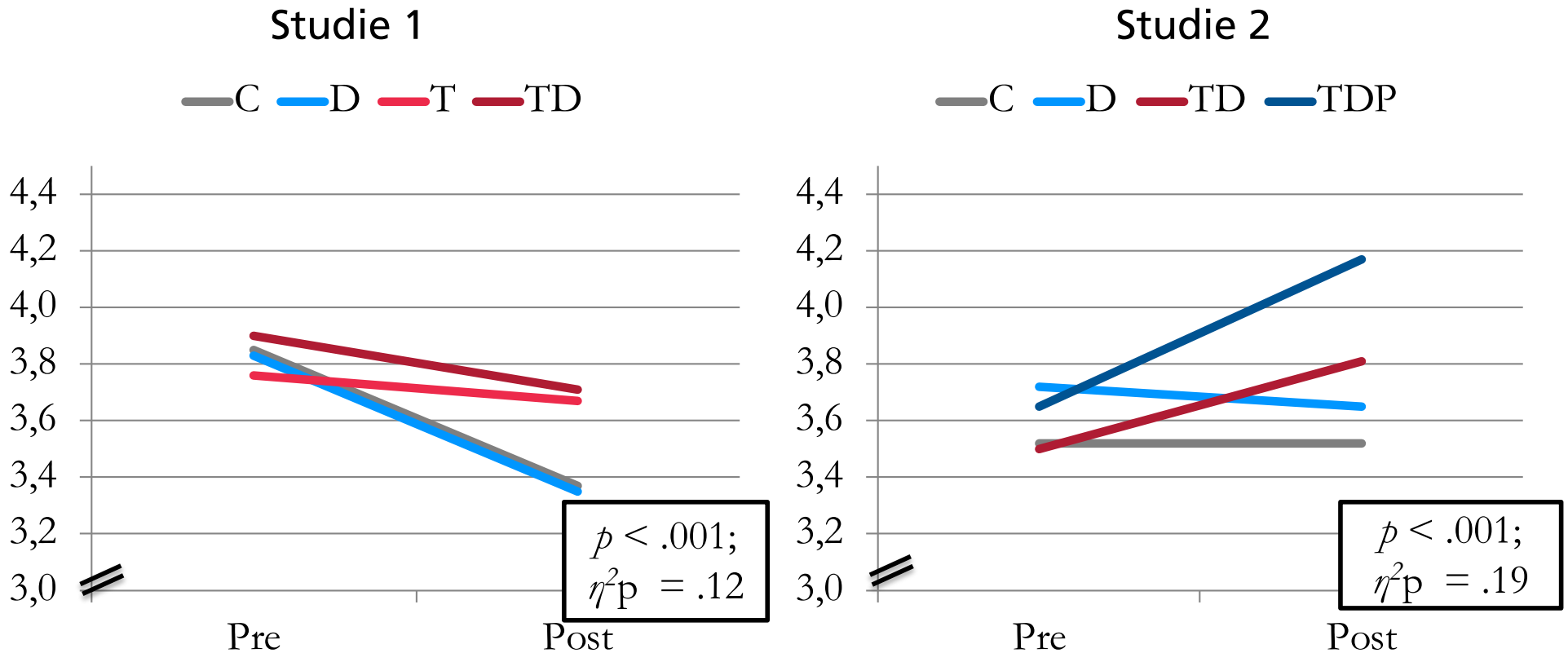
# 2) Web-basiertes Training (WBT)

## WBT auf SRL-Wissen: Starke empirische Evidenz



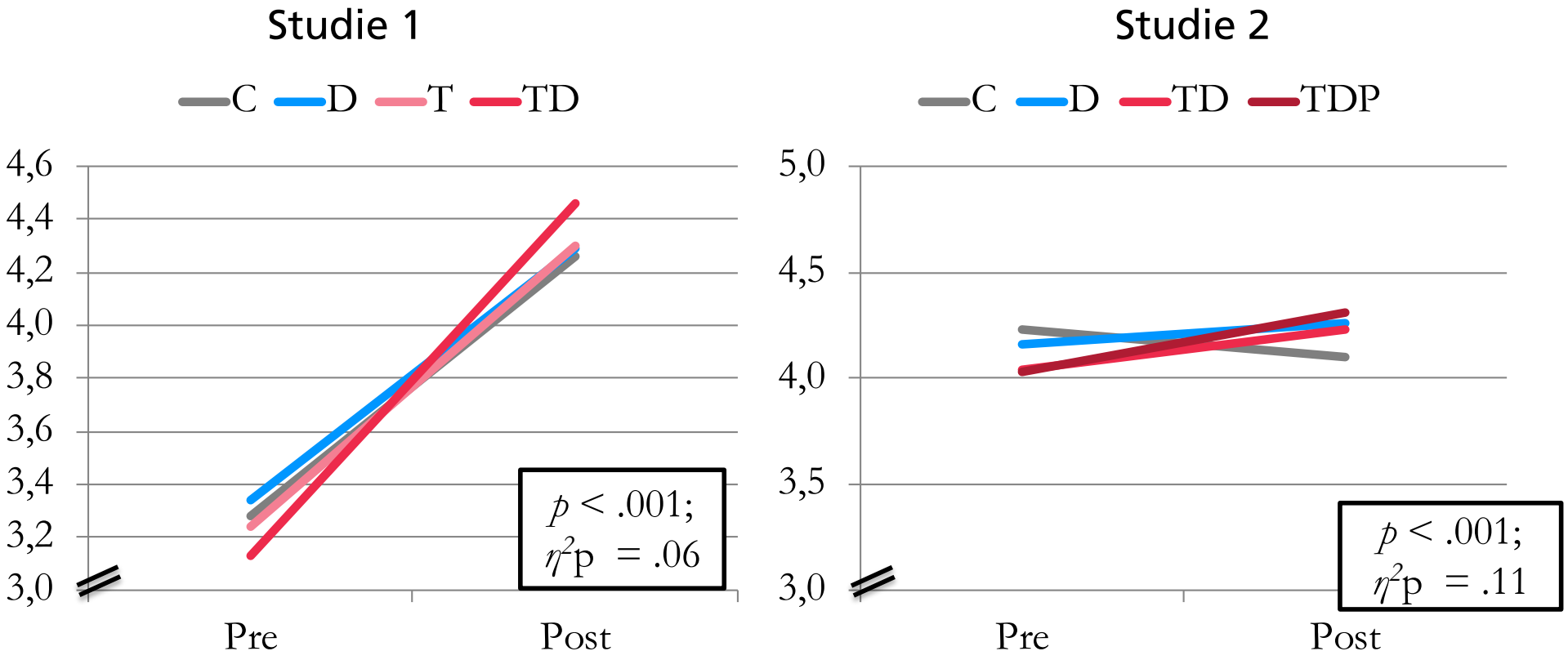
# 2) Web-basiertes Training (WBT)

## WBT auf SRL-Verhalten: Starke empirische Evidenz



# 2) Web-basiertes Training (WBT)

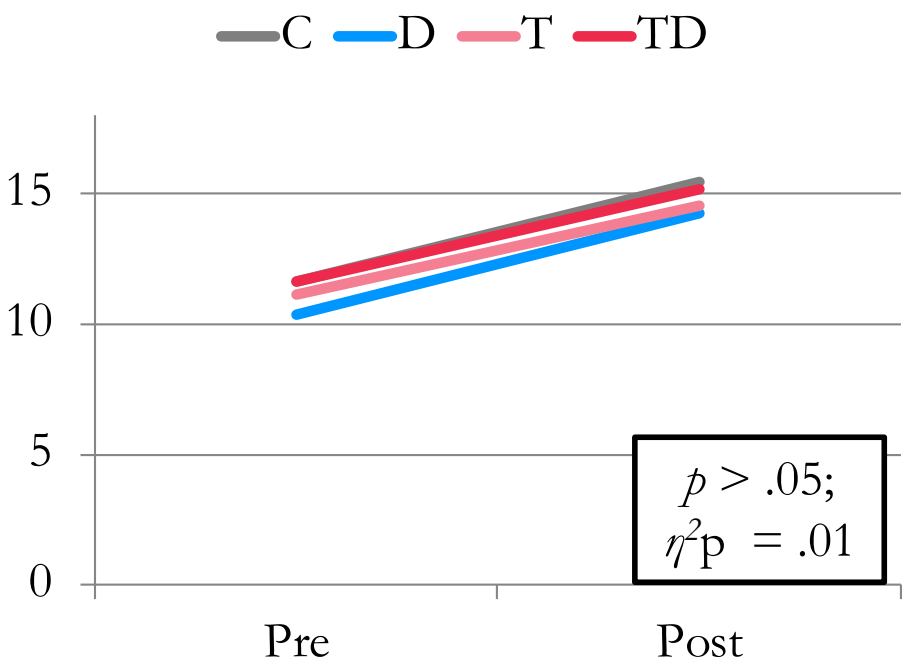
## WBT auf Selbstwirksamkeit: Starke empirische Evidenz



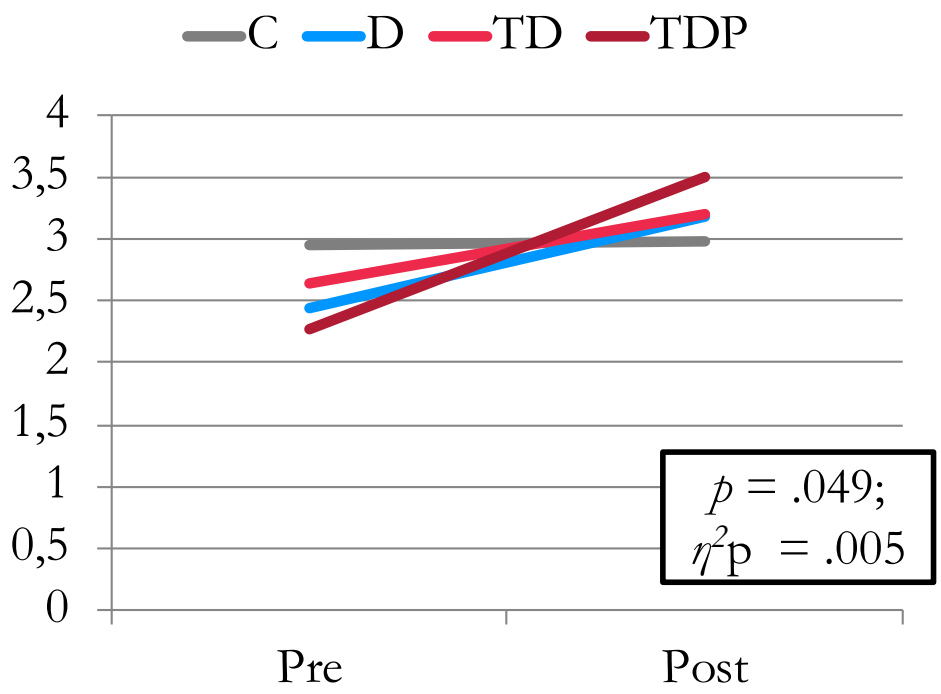
# 2) Web-basiertes Training (WBT)

## WBT auf Leistung: bislang schwache Evidenz

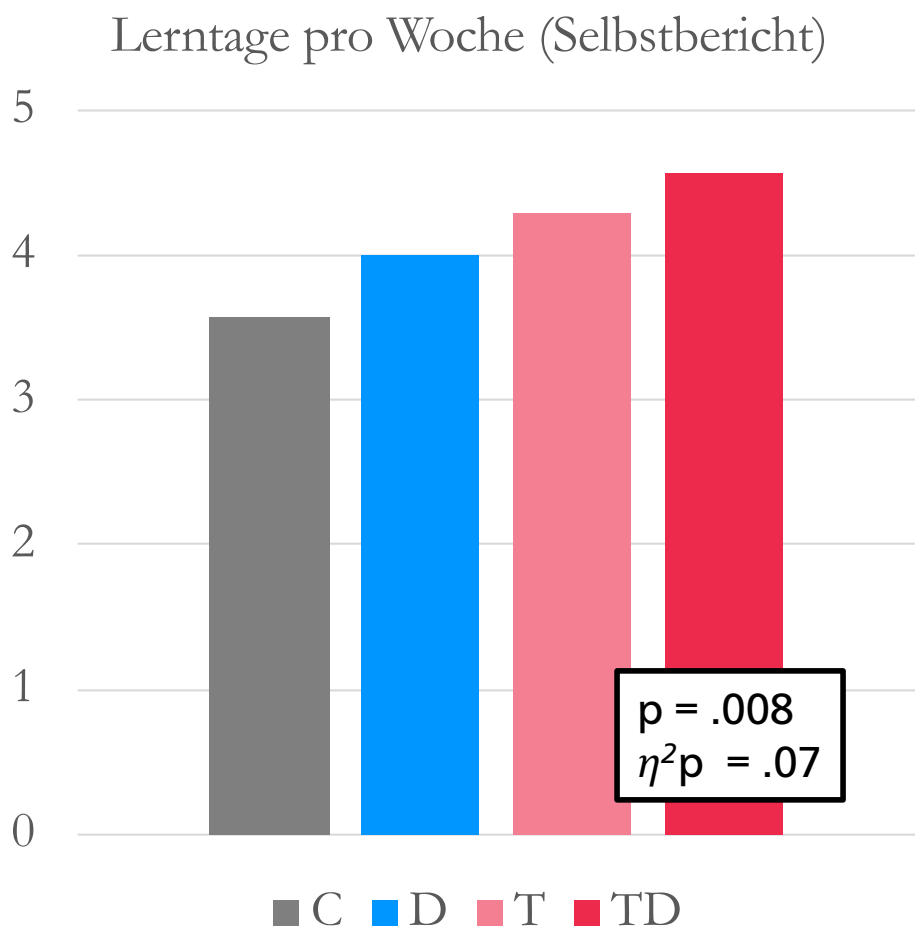
Studie 1

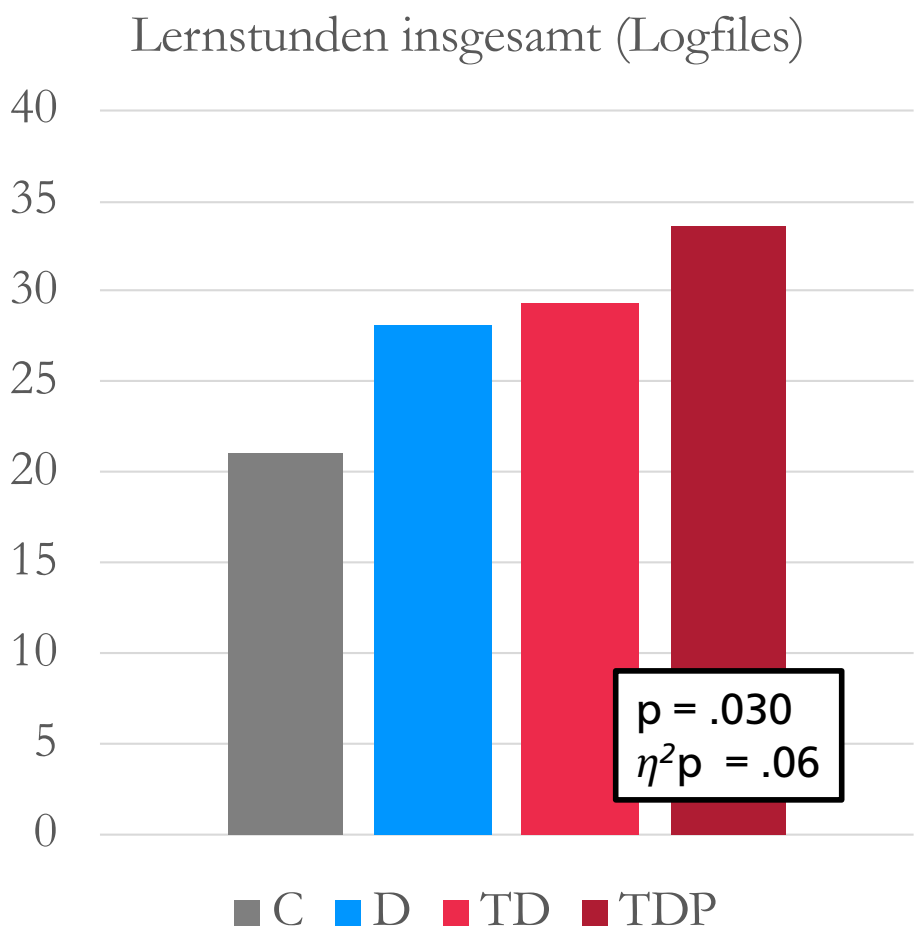



Studie 2



# 2) Web-basiertes Training (WBT)



# 3) Lerntagebücher

## Standardisierte tägliche Kurzfragebögen

- Messmethode
- Intervention

### Theobald, Dignath & Bellhäuser (under review)

N=194 Studierende

Tägliche Tagebucheinträge über 5 Wochen

Morgens: Planung; Abends: Reflexion

Experimentelles Design:

- Experimentalgruppe (tägliches Feedback)
- Kontrollgruppe (nur Tagebuch)

# 3) Lerntagebücher

## Morgens

...

**Mein heutiger Zeitplan:**

8.30h Lernbeginn
11.30h Pause
15.30h Lernzeit Ende

**Zeitinvestment geplant:**

6 Stunden

...

## Abends

...

**Mein heutiger Zeitplan:**

9.30h Lernbeginn
10.30h Pause
13.30h Lernzeit Ende

**Zeitinvestment real:**

3 Stunden

...

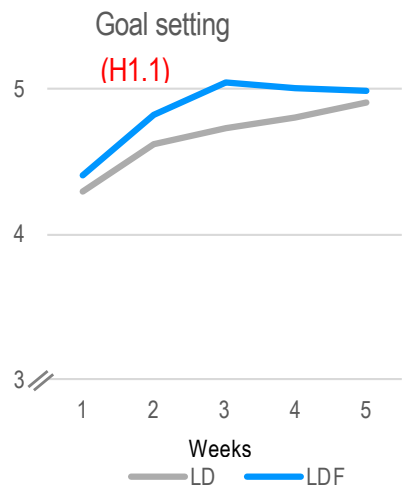
## Feedback
(nur EG)

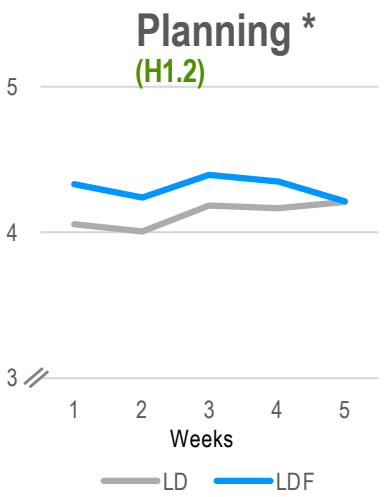
...

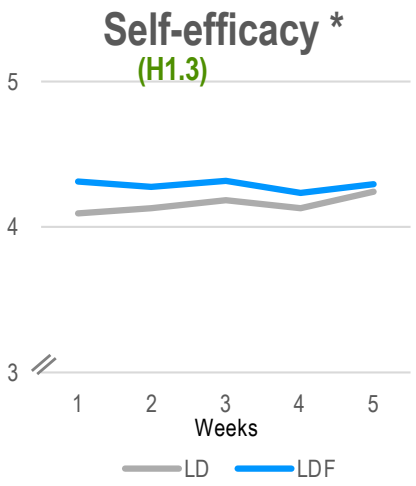
Sie haben sich heute nicht gut an Ihren Zeitplan gehalten. Versuchen Sie morgen realistischer zu planen.

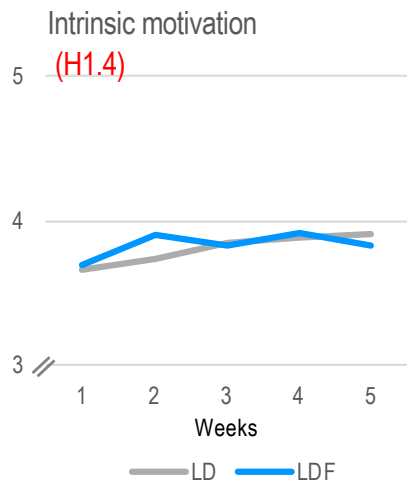
...

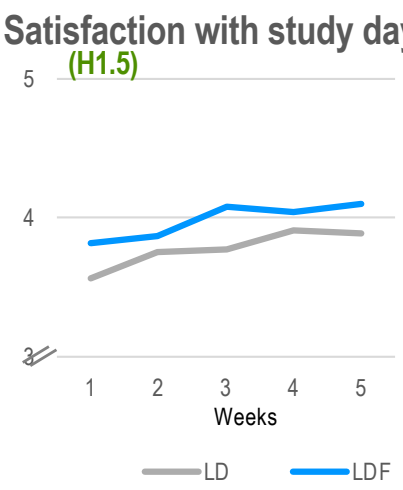
# 3) Lerntagebücher

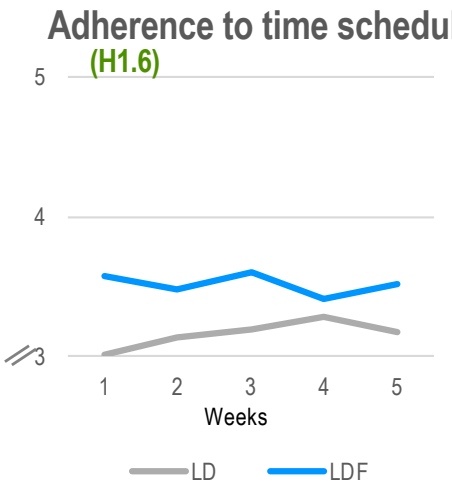


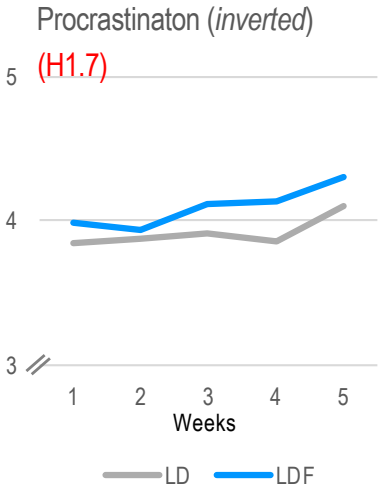



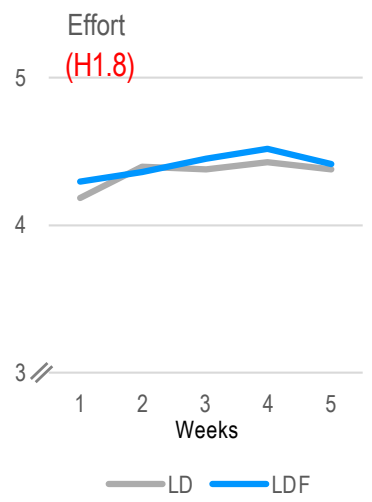



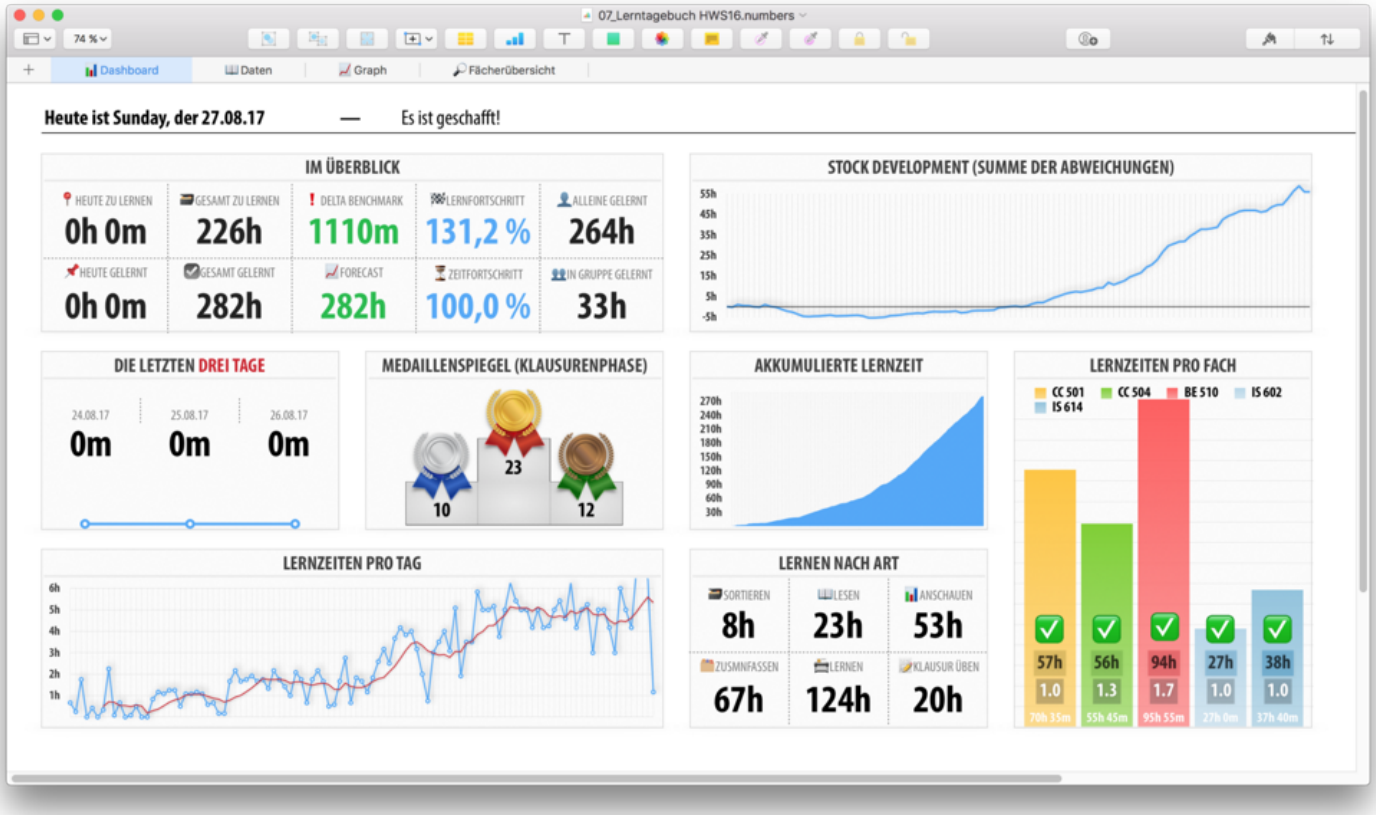



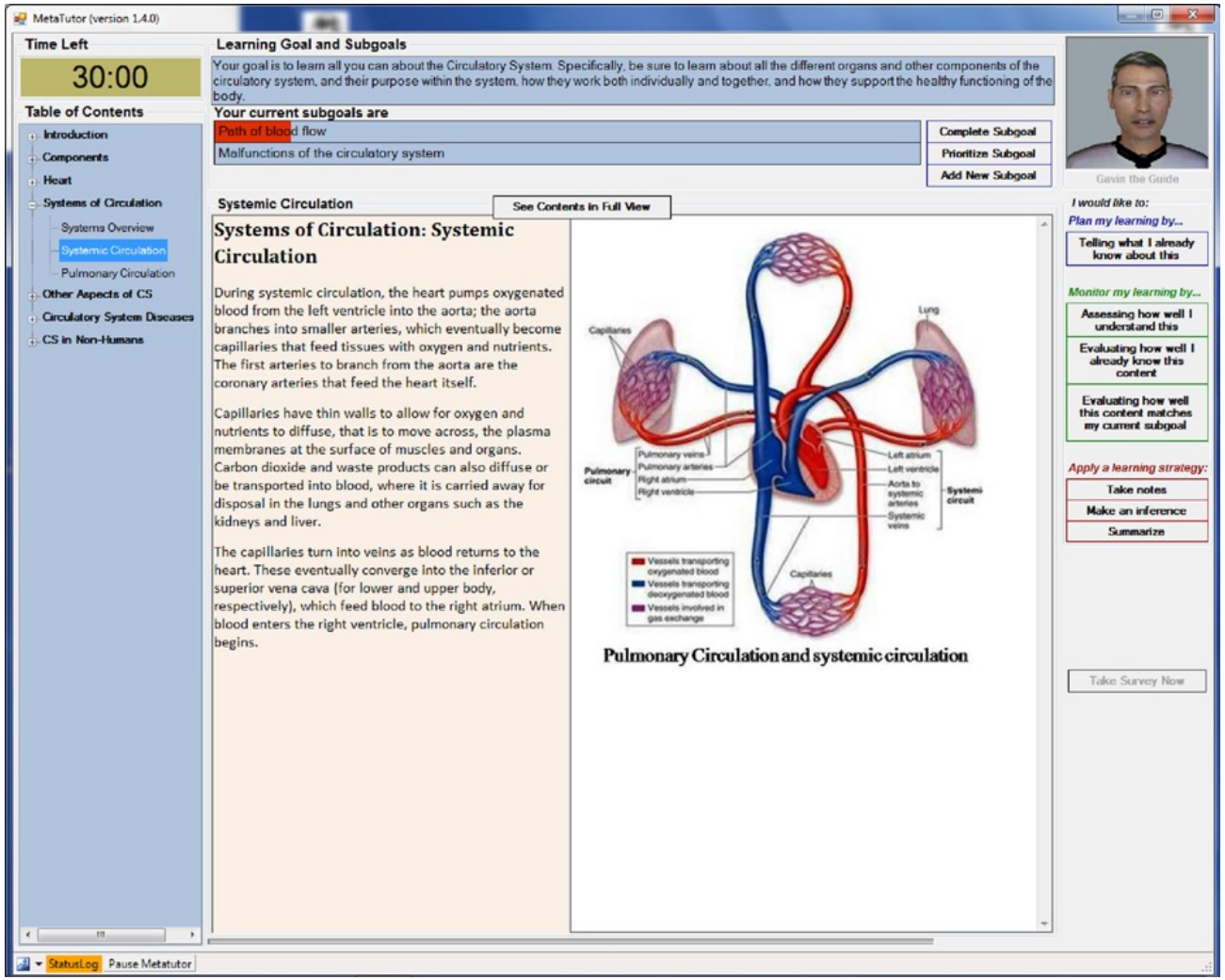



# 4) Learning Analytics & Prompting

- Automatische Erfassung von Daten über das Lernverhalten
- Rückmeldung an Dozierende und Studierende
- Prompting: konkrete Handlungsempfehlungen



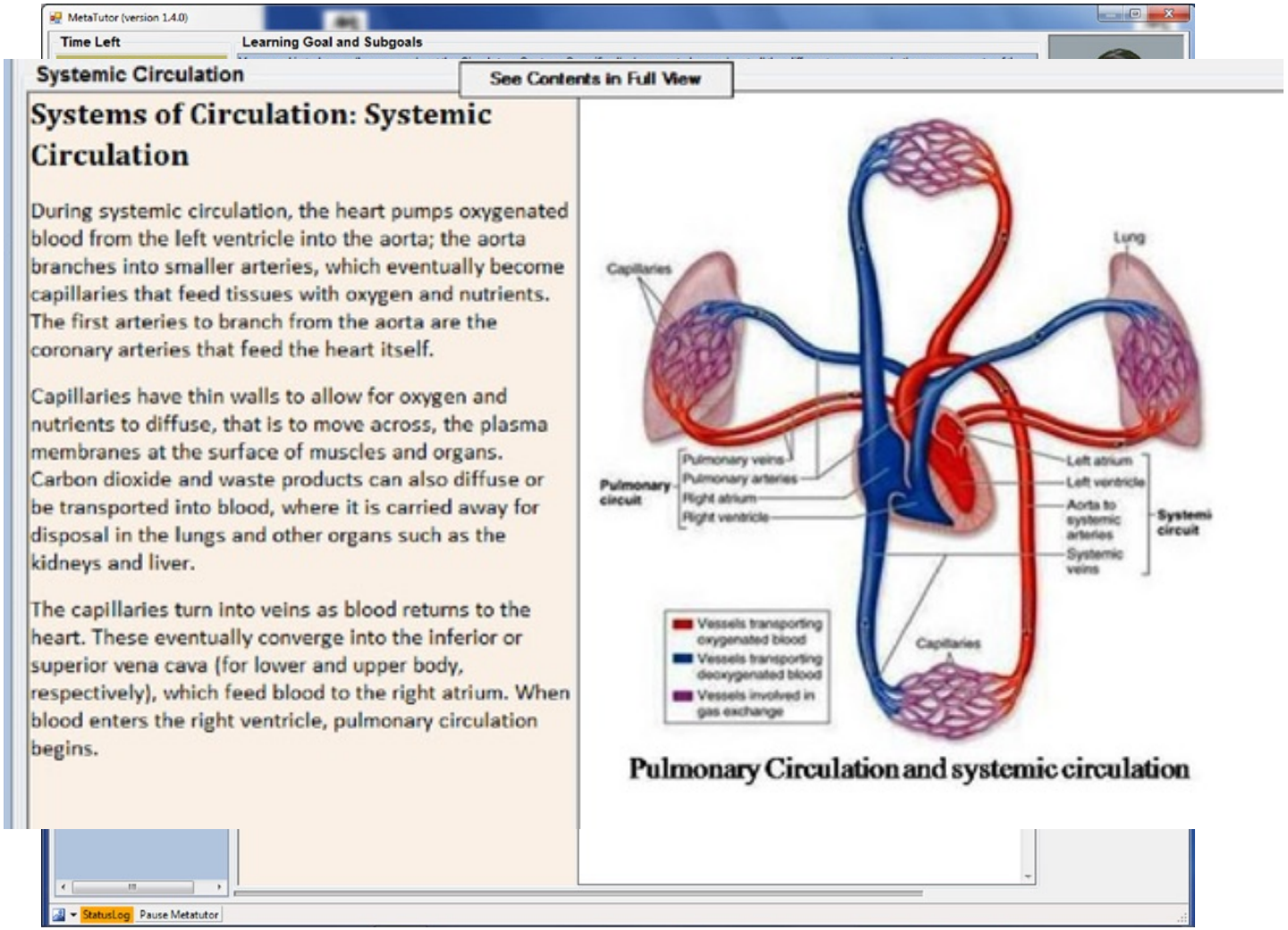
# 4) Learning Analytics & Prompting




## MetaTutor

Azevedo et al. (2010)

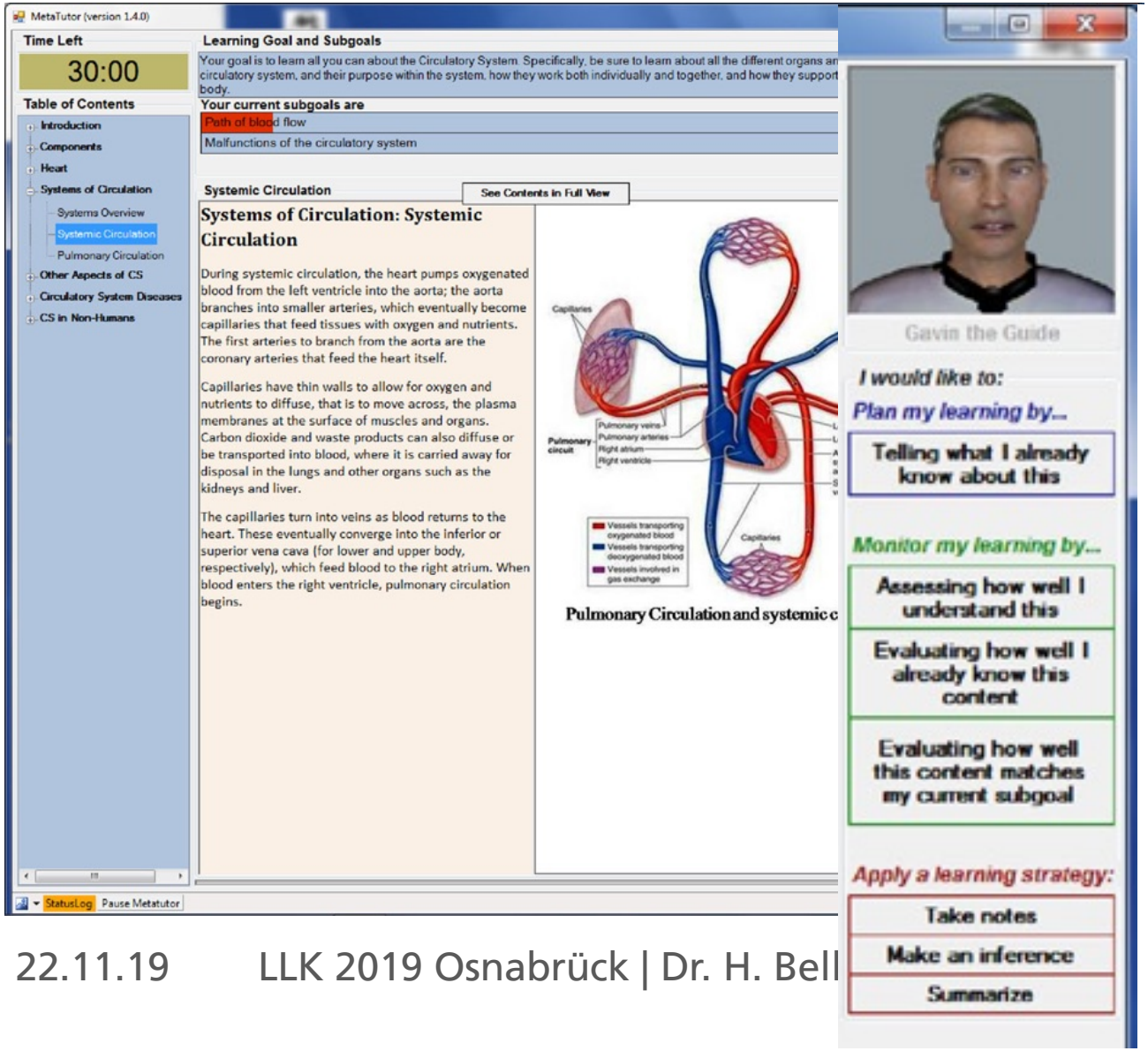
# 4) Learning Analytics & Prompting




## MetaTutor

Azevedo et al. (2010)

# 4) Learning Analytics & Prompting




## MetaTutor

Azevedo et al. (2010)

# 5) Einsatz digitaler Medien

- Ca. 4.000 empirische Studien
- Ca. 150 Meta-Analysen
- Zwei second-order Meta-Analysen (Hattie, 2009; Tamim et al., 2011)

*Review of Educational Research*
*March 2011, Vol. 81, No. 1, pp. 4–28*
*DOI: 10.3102/0034654310393361*

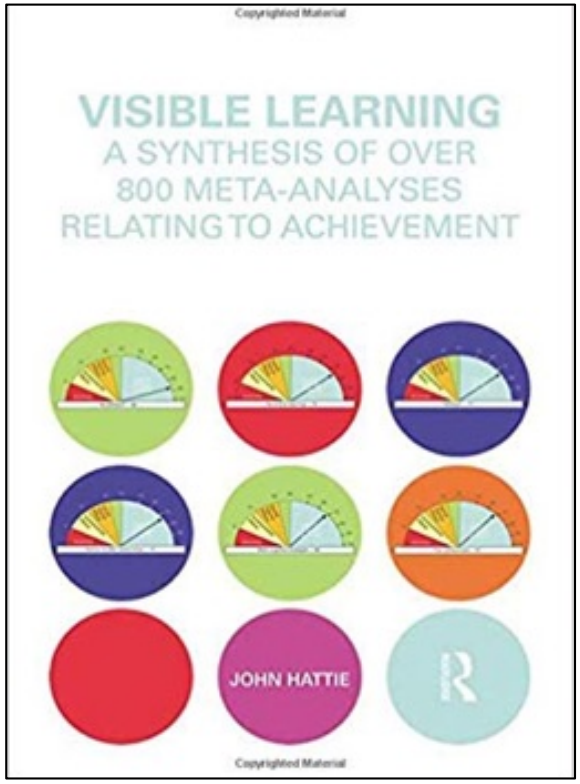

**What Forty Years of Research Says About the Impact of Technology on Learning: A Second-Order Meta-Analysis and Validation Study**

**Rana M. Tamim**
*Hamdan Bin Mohammed e-University*

**Robert M. Bernard, Eugene Borokhovski, Philip C. Abrami, and Richard F. Schmid**
*Concordia University*

*This research study employs a second-order meta-analysis procedure to summarize 40 years of research activity addressing the question, does computer technology use affect student achievement in formal face-to-face classrooms as compared to classrooms that do not use technology? A study-level meta-analytic validation was also conducted for purposes of comparison. An extensive literature search and a systematic review process resulted in the inclusion of 25 meta-analyses with minimal overlap in primary literature, encompassing 1,055 primary studies. The random effects mean effect size of 0.35 was significantly different from zero. The distribution was heterogeneous under the fixed effects model. To validate the second-order meta-analysis, 574 individual independent effect sizes were extracted from 13 out of the 25 meta-analyses. The mean effect size was 0.33 under the random effects model, and the distribution was heterogeneous. Insights about the state of the field, implications for technology use, and prospects for future research are discussed.*

**Keywords:** computers and learning, instructional technologies, achievement, meta-analysis.



# Exkurs: Meta-Analysen

Varshney et al. Journal of Otolaryngology - Head and Neck Surgery 2014, 43:40
http://www.journalotohns.com/content/43/1/40

JOURNAL OF OTOLARYNGOLOGY - HEAD & NECK SURGERY

ORIGINAL RESEARCH ARTICLE Open Access

The McGill simulator for endoscopic sinus surgery (MSESS): a validation study

Rickul Varshney[1,7*], Saul Frenkiel[1], Lily HP Nguyen[1,2], Meredith Young[2,3], Rolando Del Maestro[4], Anthony Zeitouni[1], Elias Saad[5], W Robert J Funnell[1,5], National Research Council Canada[6] and Marc A Tewfik[1]

**Abstract**

**Background:** Endoscopic sinus surgery (ESS) is a technically challenging procedure, associated with a significant risk of complications. Virtual reality simulation has demonstrated benefit in many disciplines as an important educational t… ors with appropriate validity evide… udy are to evaluate the acceptabi… rgery (MSESS) among medi… ting its ability to differentiate …

**Methods:** 10 … ons performed anterior ethm… S. Performance metrics relate… bimanual dexterity, etc.) and safe… ll users completed a post-simulatic… n the MSESS.

**Results:** The … f 7.97 ± 0.29 and 8.57 ± 0.69, re… l that it should be incorporated … (10 medical students and 10 junior … rmance metrics related to qu…

**Conclusion:** … n. This simulator may be a potential resource to help fill the void in endoscopic sinus surgery training.

**Keywords:** Rhinology, Endoscopic sinus surgery, Training, Education, Simulation, Virtual reality, Resident, Minimally invasive surgery, Haptic, Technical abilities, Performance metrics, Nasal model

d=.30

**Introduction**

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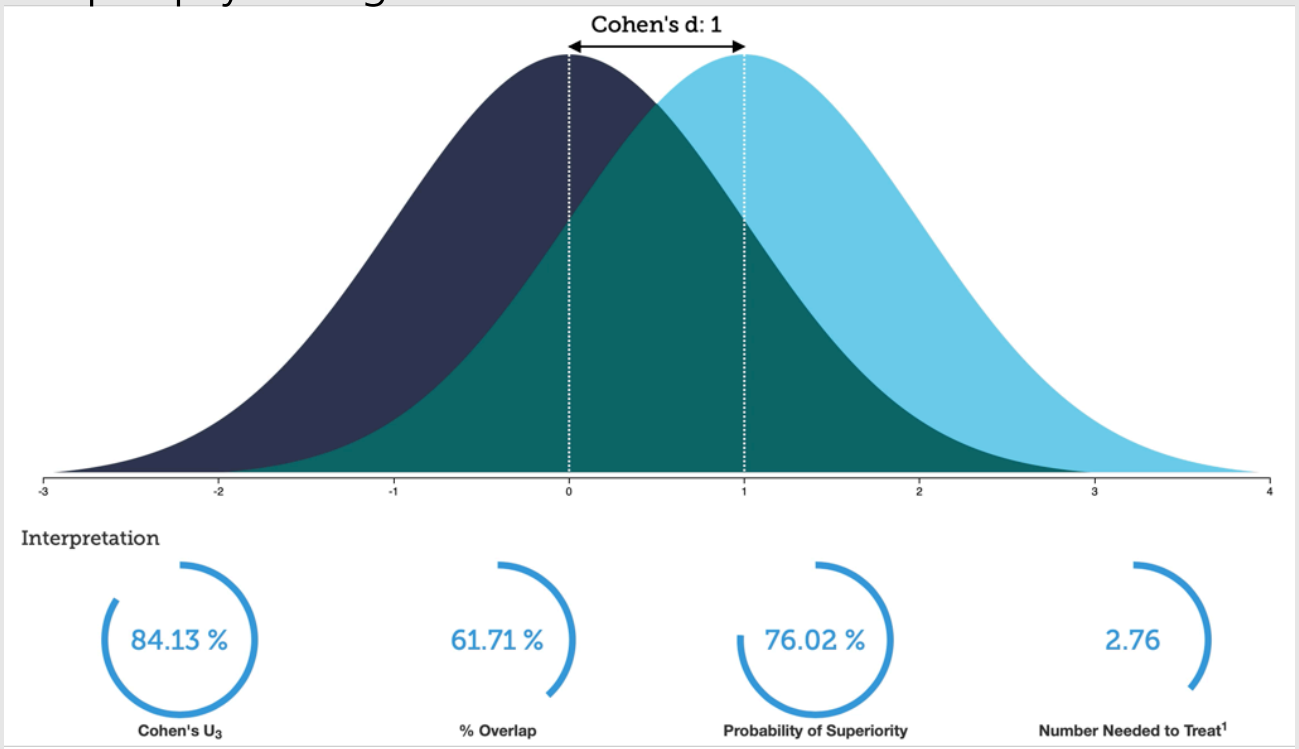
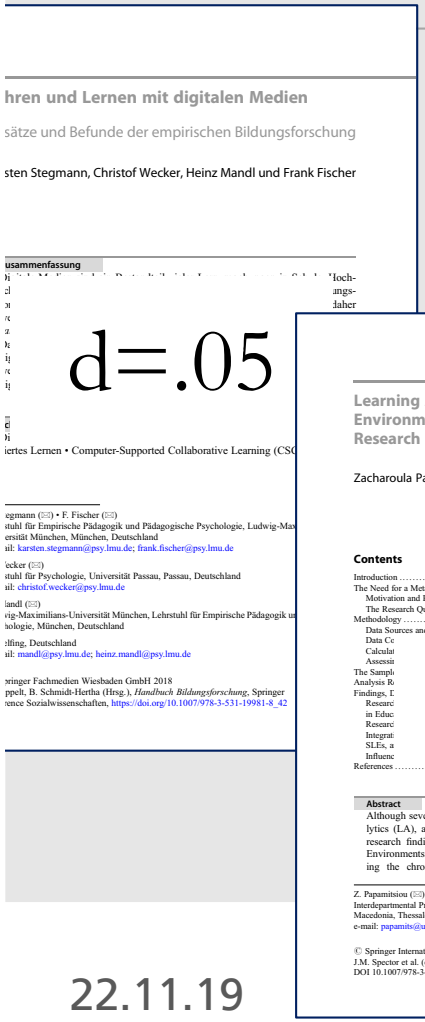
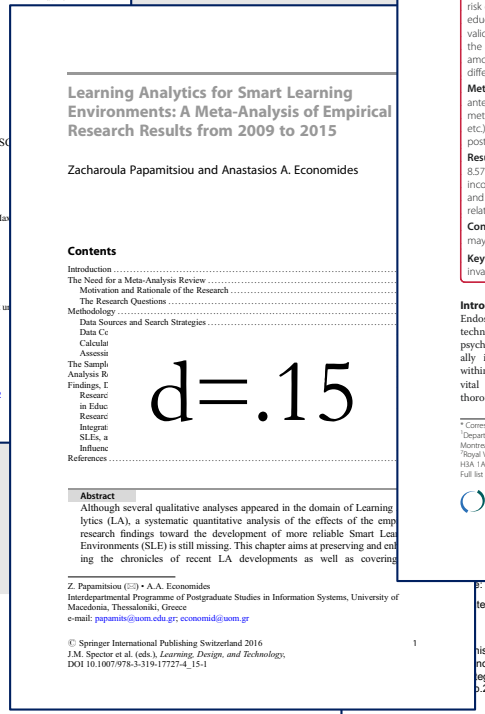
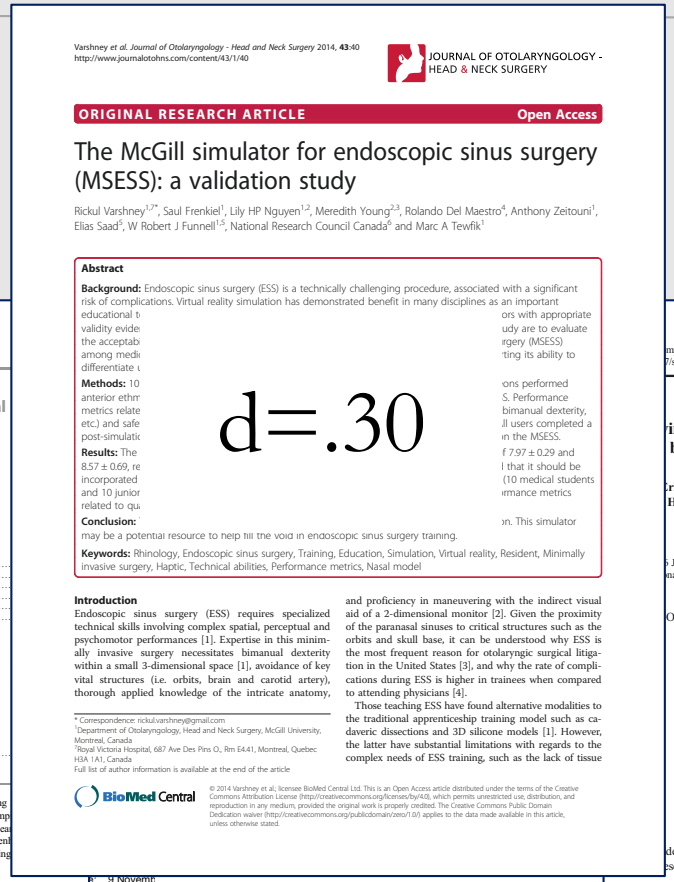
http://rpsychologist.com/d3/cohend/

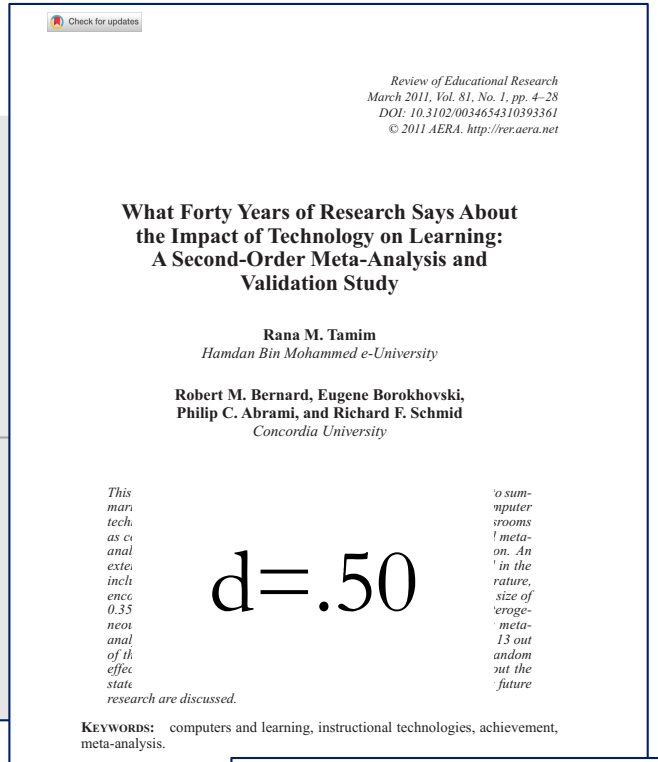


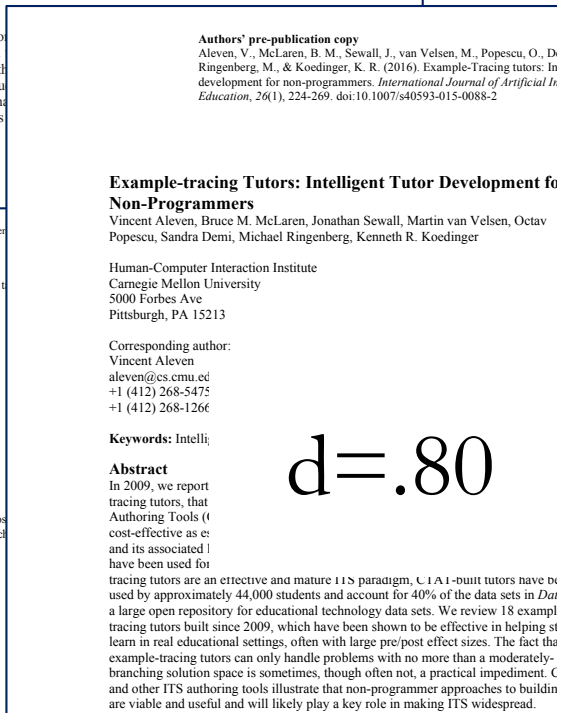
# Exkurs: Meta-Analysen

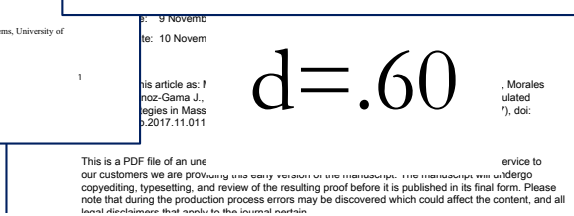


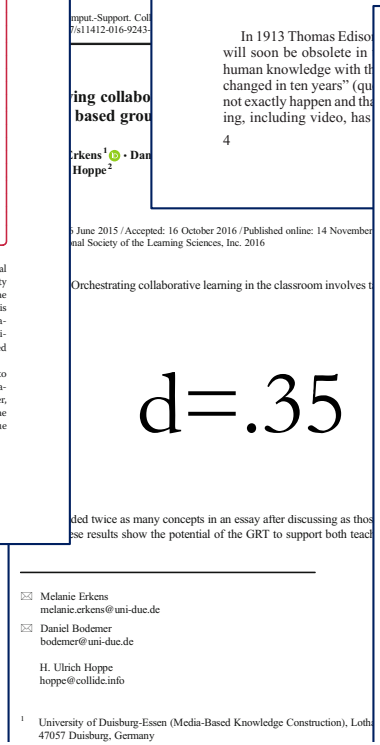




22.11.19

# Exkurs: Meta-Analysen

Varshney et al. Journal of Otolaryngology - Head and Neck Surgery 2014, 43:40
http://www.journalotohns.com/content/43/1/40

JOURNAL OF OTOLARYNGOLOGY - HEAD & NECK SURGERY

ORIGINAL RESEARCH ARTICLE Open Access

The McGill simulator for endoscopic sinus surgery (MSESS): a validation study

Rickul Varshney[1,7*], Saul Frenkiel[1], Lily HP Nguyen[1,2], Meredith Young[2,3], Rolando Del Maestro[4], Anthony Zeitouni[1], Elias Saad[5], W Robert J Funnell[1,5], National Research Council Canada[6] and Marc A Tewfik[1]


**Abstract**

**Background:** Endoscopic sinus surgery (ESS) is a technically challenging procedure, associated with a significant risk of complications. Virtual reality simulation has demonstrated benefit in many disciplines as an important educational tool for surgical training. Within the field of rhinology, there is a lack of ESS simulators with appropriate validity evidence supporting their integration into residency education. The objectives of this study are to evaluate the acceptability, perceived realism and benefit of the McGill Simulator for Endoscopic Sinus Surgery (MSESS) among medical students, otolaryngology residents and faculty, and to present evidence supporting its ability to differentiate users based on their level of training through the performance metrics.

**Methods:** 10 medical students, 10 junior residents, 10 senior residents and 3 expert sinus surgeons performed anterior ethmoidectomies, posterior ethmoidectomies and wide sphenoidotomies on the MSESS. Performance metrics related to quality (e.g. percentage of tissue removed), efficiency (e.g. time, path length, bimanual dexterity, etc.) and safety (e.g. contact with no-go zones, maximum applied force, etc.) were calculated. All users completed a post-simulation questionnaire related to realism, usefulness and perceived benefits of training on the MSESS.

**Results:** The MSESS was found to be realistic and useful for training surgical skills with scores of 7.97 ± 0.29 and 8.57 ± 0.69, respectively on a 10-point rating scale. Most students and residents (29/30) believed that it should be incorporated into their curriculum. There were significant differences between novice surgeons (10 medical students and 10 junior residents) and senior surgeons (10 senior residents and 3 sinus surgeons) in performance metrics related to quality ($p < 0.05$), efficiency ($p < 0.01$) and safety ($p < 0.05$).

**Conclusion:** The MSESS demonstrated initial evidence supporting its use for residency education. This simulator may be a potential resource to help fill the void in endoscopic sinus surgery training.



**Keywords:** Rhinology, Endoscopic sinus surgery, Training, Education, Simulation, Virtual reality, Resident, Minimally invasive surgery, Haptic, Technical abilities, Performance metrics, Nasal model


**Introduction**

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d=.05

d=.15

d=.30

d=.35

d=.50

d=.60

d=.80

# Exkurs: Meta-Analysen

Varshney et al. Journal of Otolaryngology - Head and Neck Surgery 2014, 43:40
http://www.journalotohns.com/content/43/1/40

JOURNAL OF OTOLARYNGOLOGY - HEAD & NECK SURGERY

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**d=.39**

+ Überblick über Literatur
+ belastbarer als Einzelstudien
+ Moderatoranalysen
- Äpfel-Birnen-Problem
- Garbage-in → Garbage-out

# 5) Einsatz digitaler Medien

- Ca. 4.000 empirische Studien
- Ca. 150 Meta-Analysen
- Zwei second-order Meta-Analysen (Hattie, 2009; Tamim et al., 2011)

*Review of Educational Research*
*March 2011, Vol. 81, No. 1, pp. 4–28*
*DOI: 10.3102/0034654310393361*

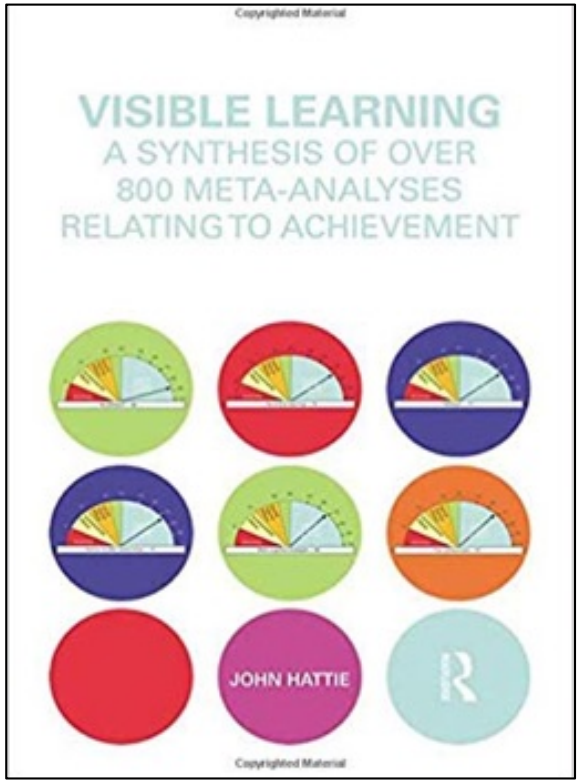

**What Forty Years of Research Says About the Impact of Technology on Learning: A Second-Order Meta-Analysis and Validation Study**

**Rana M. Tamim**
*Hamdan Bin Mohammed e-University*

**Robert M. Bernard, Eugene Borokhovski, Philip C. Abrami, and Richard F. Schmid**
*Concordia University*

*This research study employs a second-order meta-analysis procedure to summarize 40 years of research activity addressing the question, does computer technology use affect student achievement in formal face-to-face classrooms as compared to classrooms that do not use technology? A study-level meta-analytic validation was also conducted for purposes of comparison. An extensive literature search and a systematic review process resulted in the inclusion of 25 meta-analyses with minimal overlap in primary literature, encompassing 1,055 primary studies. The random effects mean effect size of 0.35 was significantly different from zero. The distribution was heterogeneous under the fixed effects model. To validate the second-order meta-analysis, 574 individual independent effect sizes were extracted from 13 out of the 25 meta-analyses. The mean effect size was 0.33 under the random effects model, and the distribution was heterogeneous. Insights about the state of the field, implications for technology use, and prospects for future research are discussed.*

**Keywords:** computers and learning, instructional technologies, achievement, meta-analysis.



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- Ca. 150 Meta-Analysen
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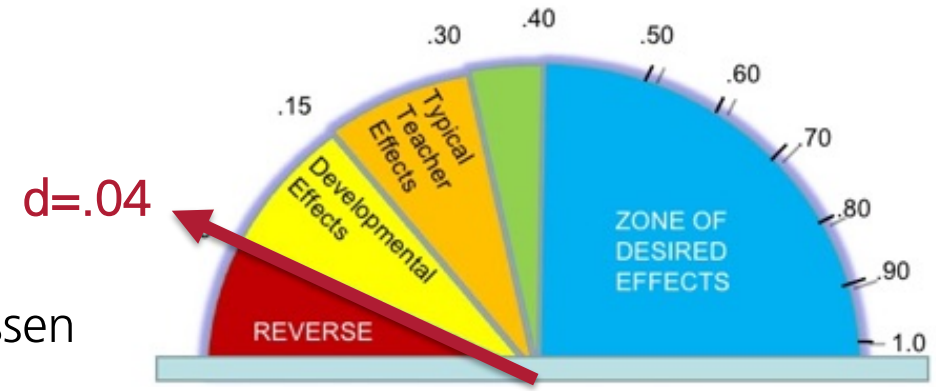
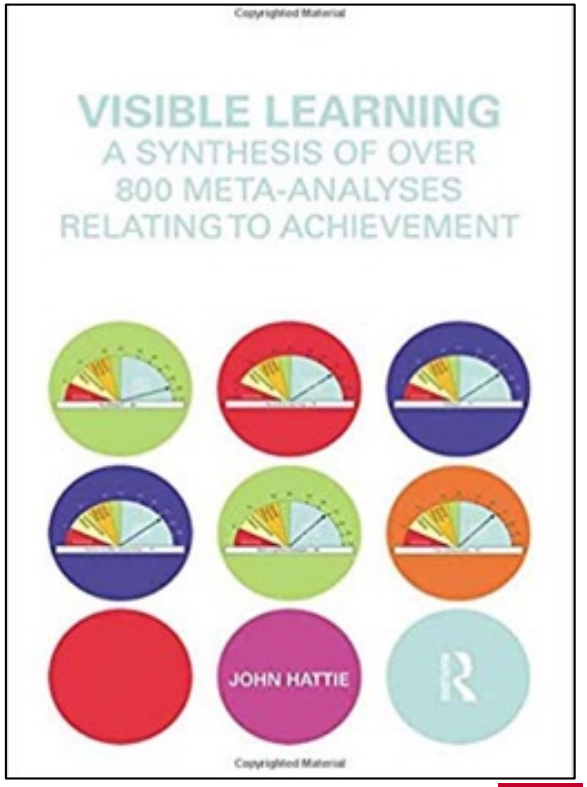
z.B. Jahrgangs-übergreifende Klassen



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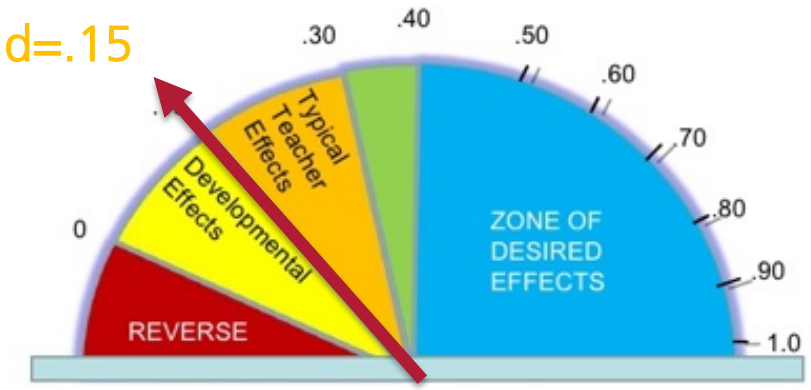
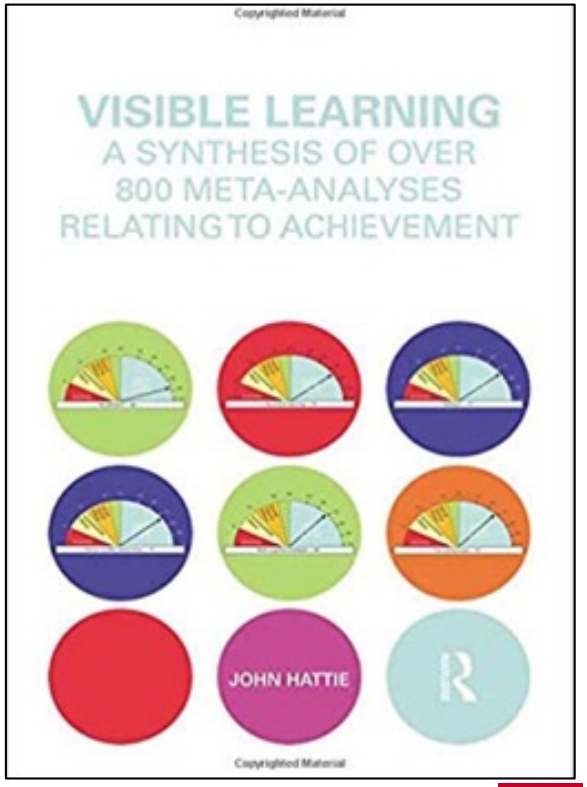
z.B. Problem-basiertes Lernen



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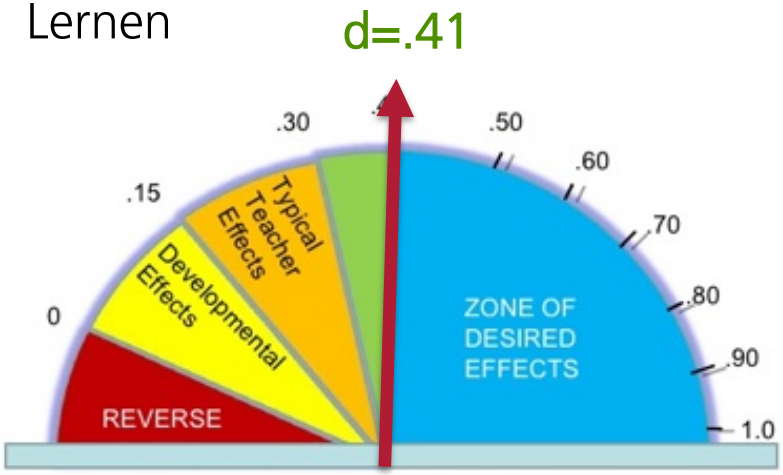
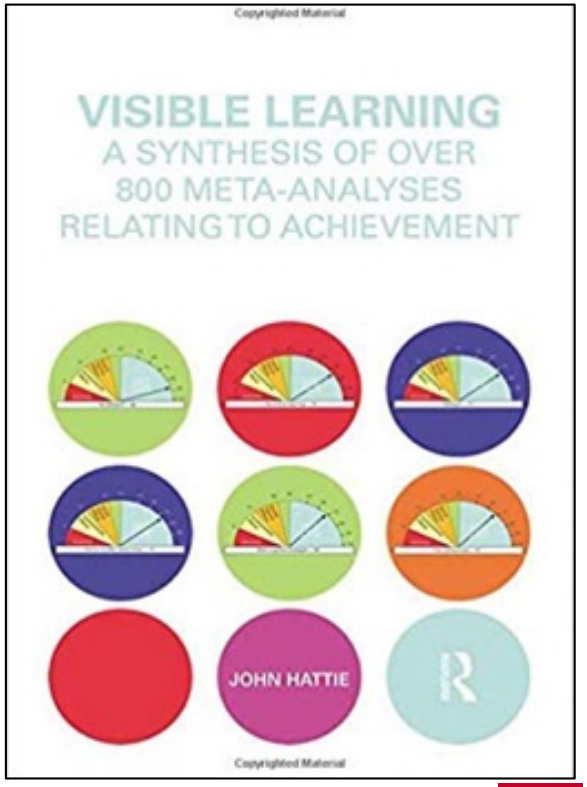
z.B. Kooperatives Lernen



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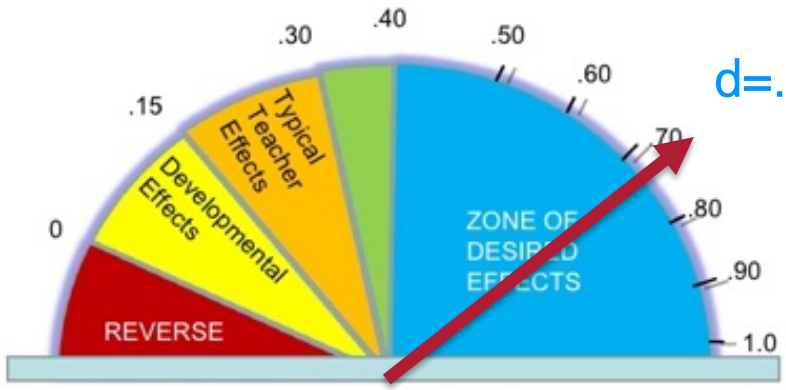
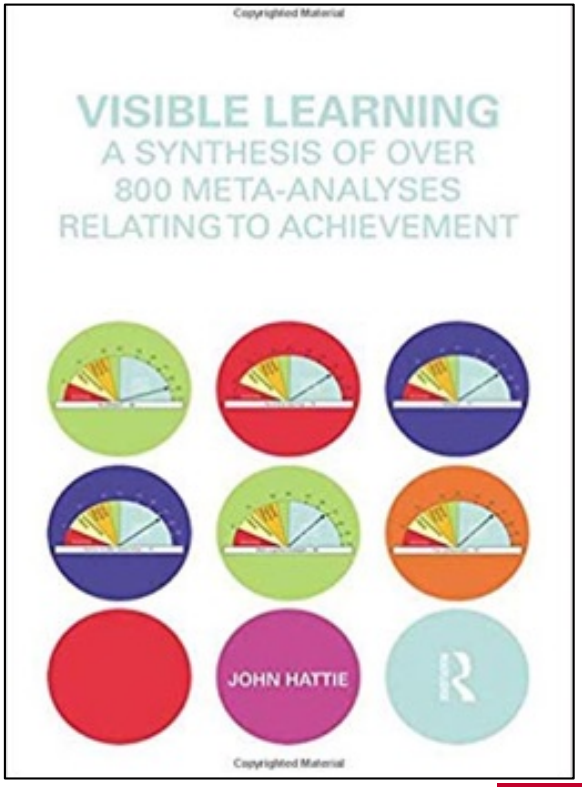
z.B. Feedback

d=.73



# Wie groß ist der Effekt? Competition

Get ready to compete!

# Wie groß ist der Effekt?

## Lernen von Vokabeln am Computer (Chiu, 2013)

## = *Bereitstellung von Übungen + Feedback*


- kein Effekt (d=.03)
- kleiner Effekt (d=.24)
- mittlerer Effekt (d=.75)
- großer Effekt (d>.91)

Total Results: 0

# Wie groß ist der Effekt?

## Game-based Learning (Wouters et al., 2013)

## *= in Spiel eingebettetes Lernen; Wettbewerbscharakter (Punktzahl, Konkurrenz)*


kein Effekt (d=.08)

kleiner Effekt (d=.22)

mittlerer Effekt (d=.62)

großer Effekt (d>.95)

Total Results: 0

# Wie groß ist der Effekt?

## Simulationsbasiertes Lernen mit virtuellen Patienten (Consorti et al., 2012)

*= authentische Problemsituationen mit Zeitraffer, Zeitlupe, Wiederholbarkeit, Individualisierung, Risikovermeidung*

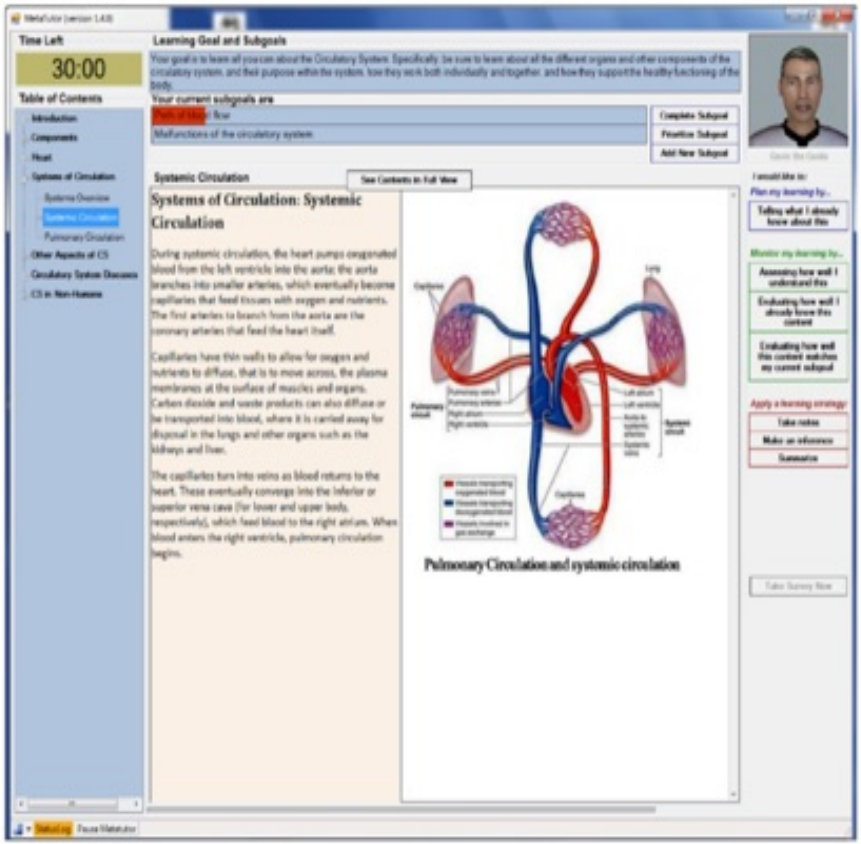
- kein Effekt (d=.07)
- kleiner Effekt (d=.32)
- mittlerer Effekt (d=.71)
- sehr großer Effekt (d=2.19)

Total Results: 0

# Wie groß ist der Effekt?

## Intelligente Tutorielle Systeme (Ma et al., 2014)

## = *adaptive Instruktion mit individuellem Feedback*




kein Effekt (d=.12)

kleiner Effekt (d=.34)

mittlerer Effekt (d=.49)

sehr großer Effekt (d=1.67)

Total Results: 0

# 5) Einsatz digitaler Medien

Warum ist Lernen mit digitalen Medien wirksam?

- Motivation (Deci & Ryan, 2000): Autonomie, Kompetenzerleben, Anschluss
- Kognitive Aktivierung (Klieme, 2006)
- Feedback (Hattie & Timperley, 2007)
- Problemlösen (Vygotsky, 1978): Zone der proximalen Entwicklung

# Take-home messages

Studierende brauchen Unterstützung beim selbstregulierten Lernen.

Seien Sie ein positives Rollenvorbild:

- Kommunizieren Sie klare Ziele für Ihre Lehrveranstaltungen!
- Zeigen Sie regelmäßig die Gliederung Ihrer Veranstaltung auf!
- Bieten Sie Raum für unterschiedliche Lernwege!
- Sprechen Sie über geeignete Lernstrategien!
- Schaffen Sie eine positive Fehlerkultur!
- Setzen Sie nicht ausschließlich auf die soziale Bezugsnorm!
- Wecken Sie die intrinsische Motivation der Studierenden!
- Besprechen Sie mit Ihren Studierenden die Evaluationsergebnisse!

Ich wünsche Ihnen eine erfolgreiche und inspirierende Konferenz!

Dr. Henrik Bellhäuser
bellhaeuser@uni-mainz.de

JOHANNES GUTENBERG UNIVERSITÄT MAINZ

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