

HVAD SIGER FORSKNINGEN OM VIRKNINGER AF IT I UNDERVISNING?

Thomas Illum Hansen
Stig Toke Gissel
Louis Køhrsen

29. oktober 2018



It virker!

~~Virker it?~~

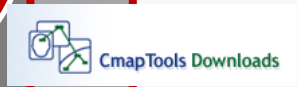
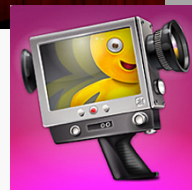
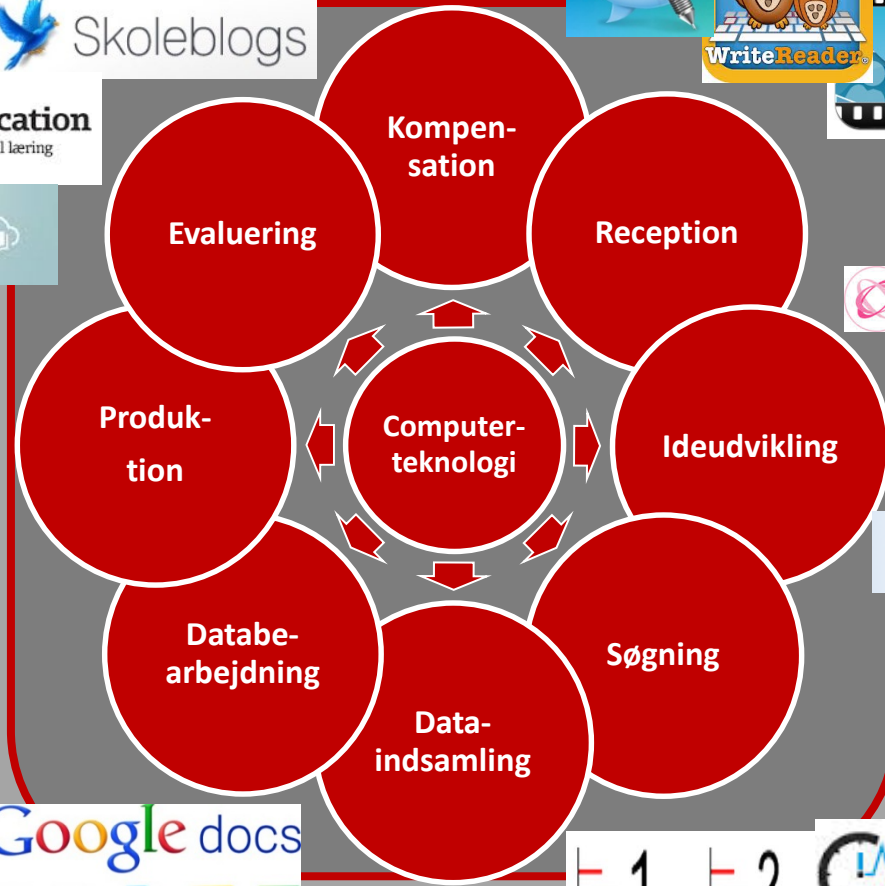
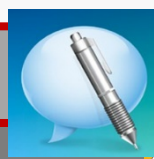
It virker!
~~Virker it?~~

Selvfølgelig!

It virker!
~~Virker it?~~

Det er bare
ikke altid
efter
hensigten!

Kommunikation og processtyring



LÆRE
MIDDEL
DK

Hvad er hensigten?

Kvalitet i undervisningen:

- Der fremmer faglig, social og personlig udvikling og dannelse
Herunder alsidighed, musikalitet, social mobilitet, arbejdsduelighed, demokratisk dannelse...

En formel for skalerbar kvalitet i undervisningen:

- Tid x opmærksomhed x materiel investering x målbarhed x indholdskvaliteter x virkningskvaliteter...

What Forty Years of Research Says About the Impact of Technology on Learning (Tamim et al. 2011: 14 & 15)

TABLE 2

Mixed effects comparison of levels of methodological quality

Level	<i>k</i>	<i>ES</i>	<i>SE</i>	<i>Q</i> statistic
Low	8	0.42*	0.07	
Medium	7	0.35*	0.04	
High	10	0.31*	0.03	
Total between				2.50 [†]

[†]*p* = .29. **p* < .05.

TABLE 3

Results of the analysis of two moderator variables

Level	<i>k</i>	<i>ES</i>	<i>SE</i>	<i>Q</i> statistic
Primary purpose of technology use				
Direct instruction	15	0.31*	0.01	
Support instruction	10	0.42*	0.02	
Total between				3.86*
Grade level of student				
K–12	9	0.40*	0.04	
Postsecondary	11	0.29*	0.03	
Total between				4.83*

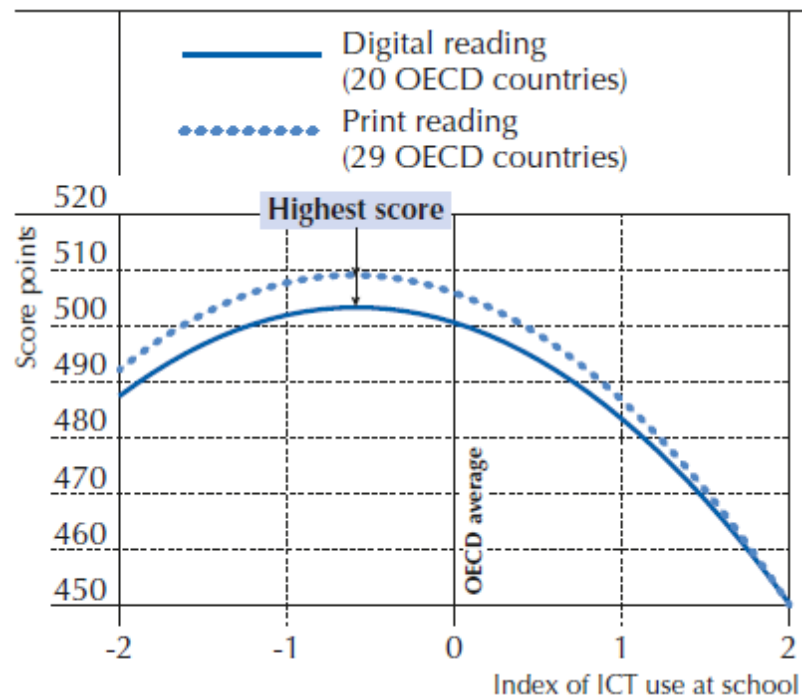
Thus, it is arguable that it is aspects of the goals of instruction, pedagogy, teacher effectiveness, subject matter, age level, fidelity of technology implementation, and possibly other factors that may represent more powerful influences on effect sizes than the nature of the technology intervention. (Tamim et al. 2011: 17)

Theoretically, the net effects of ICT investments in schools, the use of CAI in schools, and the use of computers at home on educational outcomes are ambiguous [...] Schools should not expect major improvements in grades, test scores, and other measures of academic outcomes from investments in ICT or adopting CAI in classrooms. (Bulman & Fairlie 2016: 275)

Overall, the most frequent pattern that emerges in PISA data when computer use is related to students' skills is a weak or sometimes negative association between investment in ICT use and performance. (OECD, 2015: 153)

Students' skills in reading, by index of ICT use at school

OECD average relationship, after accounting for the socio-economic status of students and schools



OECD (2015), *Students, Computers and Learning: Making the Connection*, PISA, OECD Publishing. P. 153.

Virkning under hvilke omstændigheder?

- OECD: Positive effekter ses i studier, der fokuserer på effekter af specifikke teknologier i specifikke kontekster.
- Demonstrationsskoleforsøg (2013-15): De positive effekter var forbundet med specifikke didaktiske rammesætninger af it i fagene.
- Gerick et al. (2014) undersøgte en mængde studier og metastudier og konkluderede overordnet, at effekten af computerbrug afhænger af undervisningsmetode og kontekst (Gerick et al. 2014, p. 221).

Vores hypotese...

- I offentligheden har fokus primært været på *generisk* evidens og effekt af it: politiske argumenter, undersøgelser og svar som egner sig til at besvare det brede spørgsmål: *Virker it i undervisningen?*
- Men i den didaktiske praksis giver spørgsmålet typisk først mening, når vi kigger på *specifik* effekt.
- Specifik effekt er, hvor en indsats med anvendelse af it i undervisningen er indlejret i en specifik forandringsteori om, hvordan fx et it-redskab skal anvendes didaktisk for at opnå et specifikt didaktisk formål i en bestemt kontekst, fx et bestemt fagligt område på specificerede klassetrin.
- Vi bør skelne mellem:
 - **Didaktiseringsgrad**, som handler om stilladsering af elever og lærere.
 - **Didaktiseringsmåde**, som handler om variation af mål, indhold og metoder.

Design af review

Kritisk review – ”hvor ligger landet?”

Hvordan bliver det undersøgt?

Hvad bliver undersøgt?

Er det noget der bliver overset?

På hvilke måder bliver it inddraget?

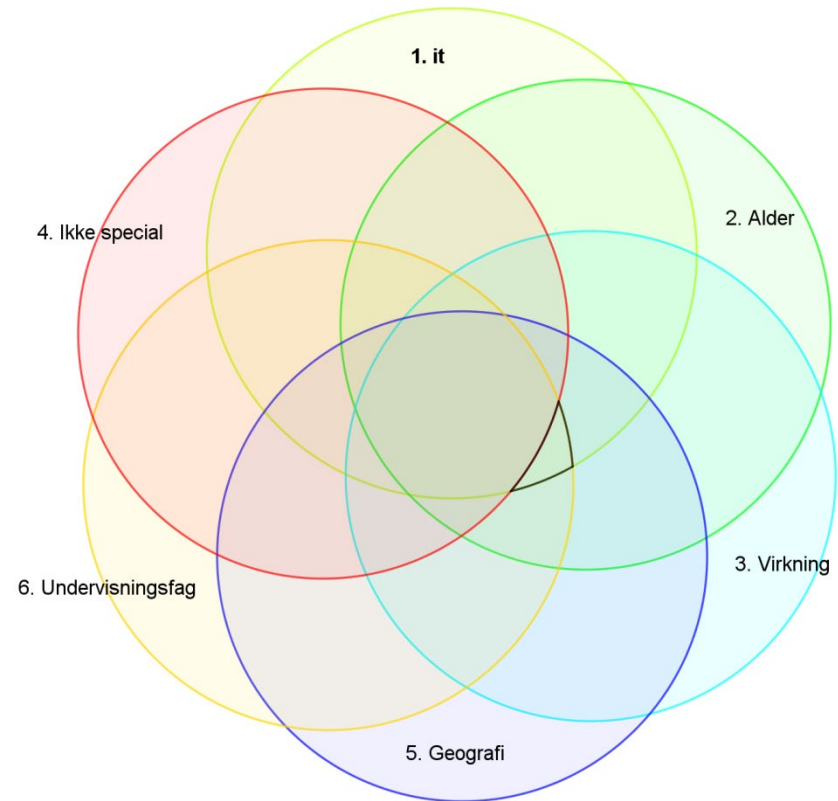
Ikke hvad der
virker bedst

Hvad siger forskningen om, hvordan it virker i undervisningen i grundskolen, hvilken definition af it opereres der med, hvilke faktorer har vist sig centrale i forhold til virkning af it – og hvordan kan spørgsmålet overhovedet stilles og hvordan er det blevet undersøgt?

Undersøgelsen er lavet som en bloksøgning i Erik, PsykInfo, Academic Search Premier, Teacher Reference Center, Library, Information Science & Technology Abstract og SocINDEX. Der er valgt kun er blive søgt på engelsksprogede artikler, der medtages kun peer reviewede studier inden for de seneste 5 år.

Bloksøgning

1. Hvad: it
2. Hvem: Grundskolen
3. På hvilken måde: Virkning
4. Hvem ikke: Specialområde
-
5. Hvor: Vesten
6. I hvilken sammenhæng:
Førstesprog, Fremmedsprog,
Matematik og Naturvidenskab.



1. it

både mindre studier af specifikke teknologier eller teknologiske tilgange og de brede indsatser.

Det betyder, at vi har forsøgt at lave en **udtømmende liste** over begreber der kan indfange hvad it er i skolen (106 begreber).

It bliver set så rammesættende at det skal fremgå af metadata, herunder abstract for at blive taget med.

1. it

Fysiske artefakter, fx tablets, laptops, PC m.m.

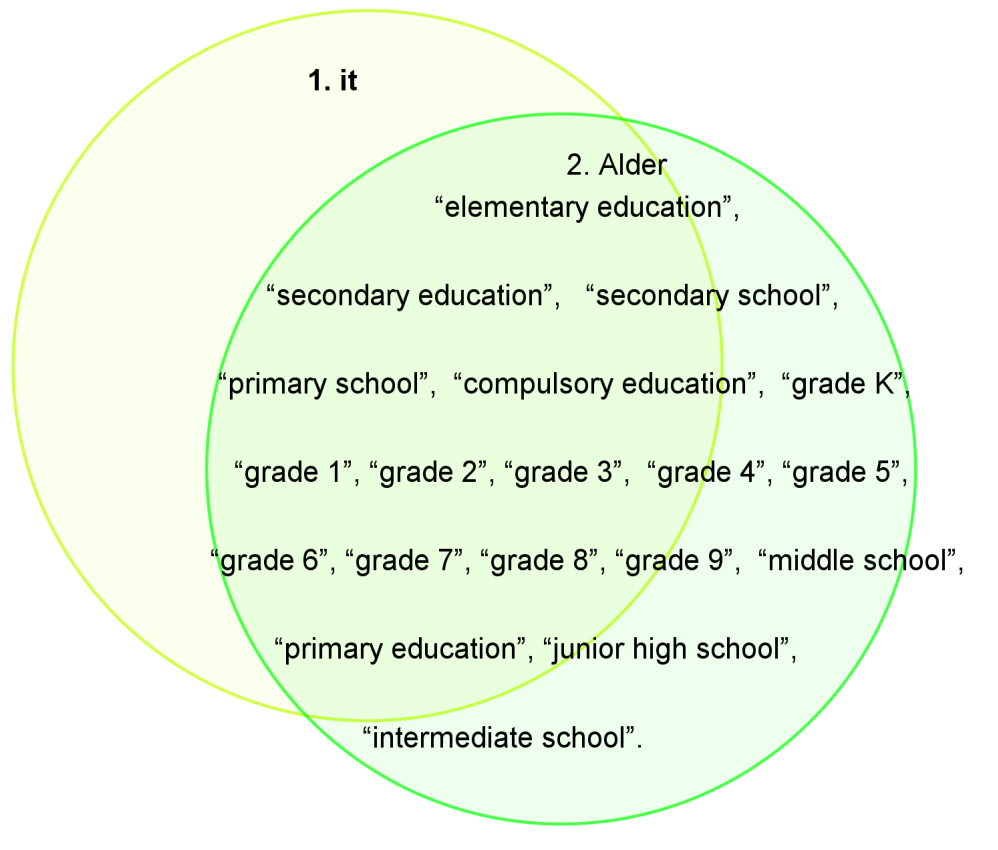
Attributorde til eksisterende praksis som fx teknologi*, compute*, digital* m.m.

Org. teknologier, LMS'er, e-learning, MOOC m.m.

it-understøttede handlingsformer fx chat, programmering m.m.

2. Alder

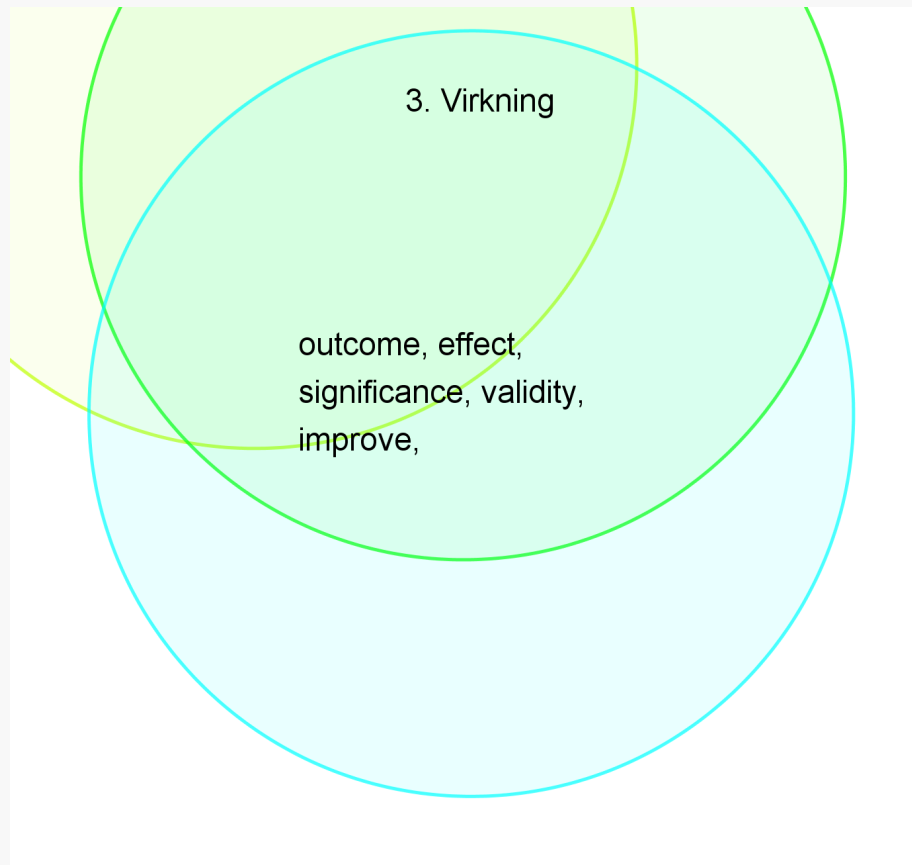
Aldersgruppen for studiet er sat til hvad der svarer til den danske grundskole. Vi søger specifikt og ikke bredt på læring og undervisning grundet støj.



3. Virkning

Vi ønsker ikke at fremsøge potentialer, men derimod forskning der viser noget om den virkning it har på eleverne i skolen.

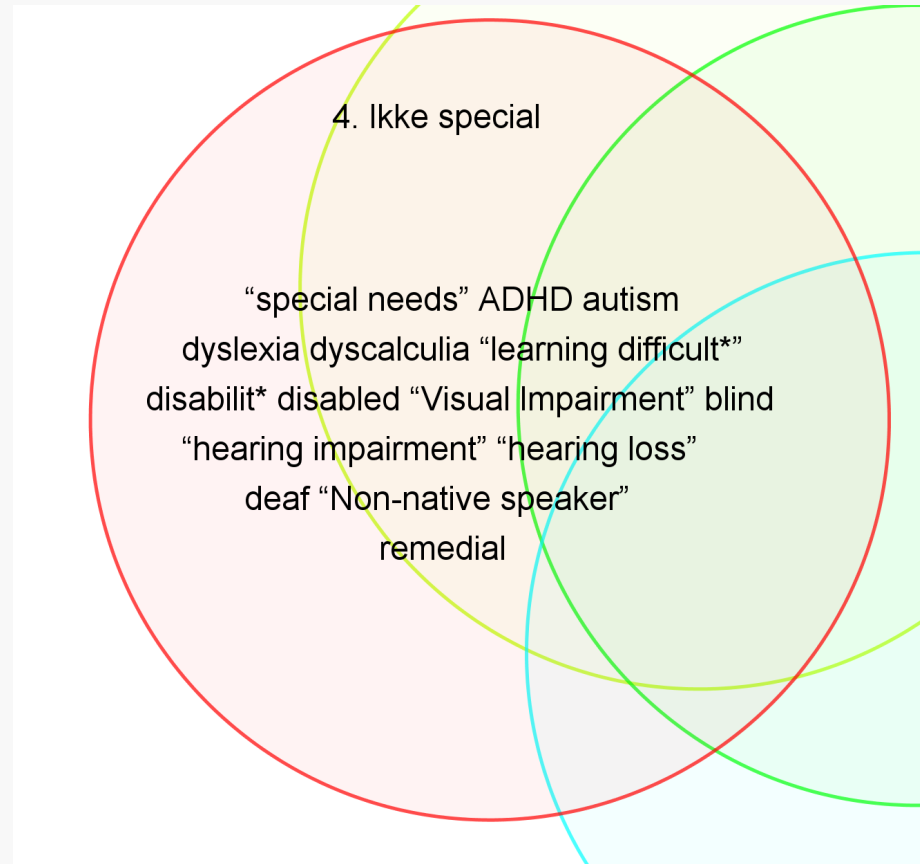
Da kortlægningen ønsker at kunne svare på om og hvordan it virker laves en blok der søger på virkning.



4. Ikke special-

Da der ønskes et generelt billede af virkningen af it, vælges der kun at kigge på normalområdet.

Det betyder at specialindsatser rettet mod mindre grupper af elever ikke bliver taget med. Fx indsatser rettet med ADHD, dysleksi, døvhed m.m. ikke tages med.



Resultat af den første søgning

Den oprindelige bloksøgning gav efter optimering af strengene stadig ca. 60.000 hits.

Konsekvens:

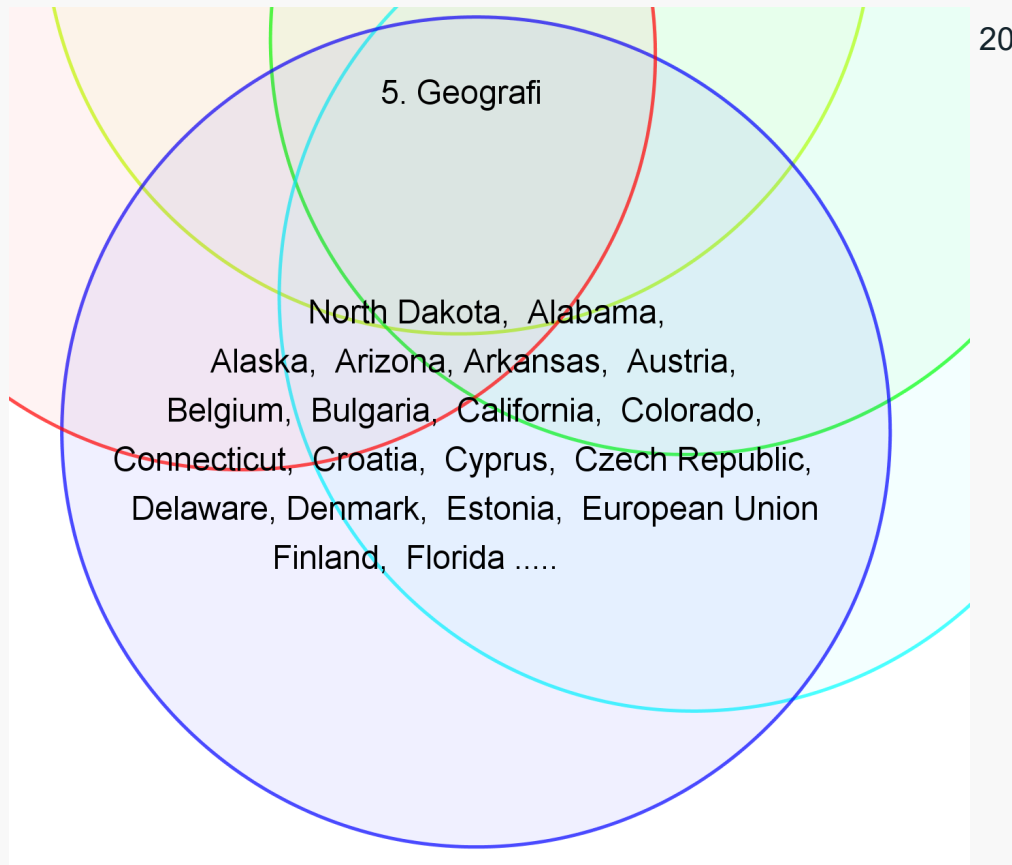
- Ikke muligt at svare på så bredt et spørgsmål. De yderligere kategorier vil gøre, at vi vil kunne svare på færre spørgsmål end vi oprindeligt ønskede.
- At spørgsmålet bliver begrænset til at omhandle de seneste 5 år i stedet for 10.
- At der kun spørges ind til fire fagområder.
- At der kun spørges ind til hvad forskningen i Vesten beskriver.



5. Geografi

Geografisk bliver der afgrænset til det der bliver betegnet som Vesten, ud fra en ide om at det vil være mest relevant og sammenligneligt med danske forhold.

Der kan være argumenter for at forskning foretaget i Rusland eller Japan kan være lige så relevant for en dansk kontekst som forskning foretaget i USA eller Grækenland. Hvilket kunne være interessant at efterprøve.

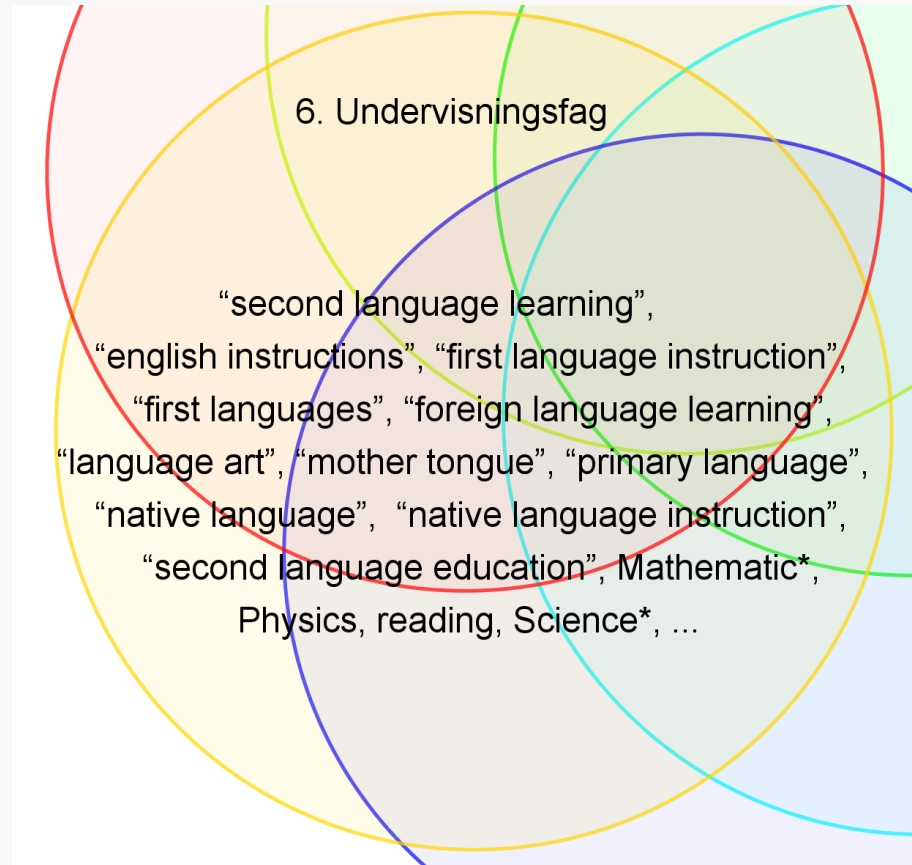


6. Undervisningsfag

Afgrænsningen tager udgangspunkt i skolens organisering i fag og fokus på undervisning i fag. Derfra er valgt 4 centrale fagområder.

- Første sprog
- Fremmedsprog
- Matematik
- Naturvidenskab

Det betyder at mere generelle undersøgelser af it, herunder tidens fokus på fx 21. århundredes kompetencer vil ryge ud, hvis det ikke også siger noget om at have en virkning på elever i et af de fire fagområder.



Sortering

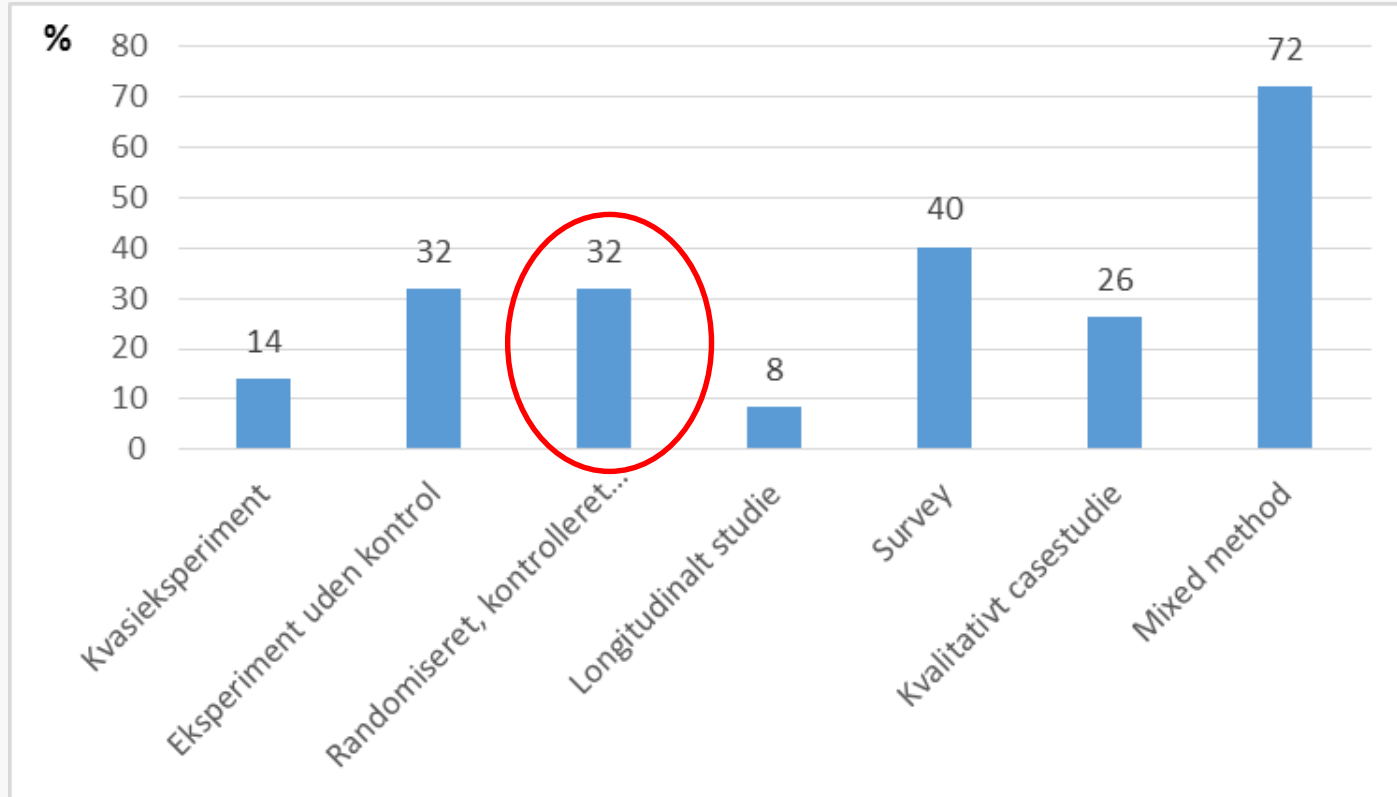
1. Er der tale om at it er det centrale der undersøges?
2. Er der tale om minoriteter/minoriserede grupper?
3. Er det inden for den korrekte aldersgruppe?
4. Er forskningen rettet mod virkning på elevniveau?
5. Er det inden for de relevante fagområder?
6. Er indsatsen koblet på almindelig skolsk praksis?



	Antal
Efter første bloksøgning	60.000
Efter tilføjede blokke	2.200
Efter håndsortering via metadata	450
Efter gennemlæsning	72/143 læste

Scoring af it-studier, resultater og prototyper.

Forskningsdesigns



4 prototyper på studier

#1: Randomiseret, kontrolleret eksperiment, der oftest måler effekt af et didaktisk læremiddel.

#2:

#3:

#4:

A cluster randomized control field trial of the ABRACADABRA web-based reading technology: replication and extension of basic findings

Noella A. Piquette¹, Robert S. Savage² * and Philip C. Abrami³

¹ Faculty of Education, University of Lethbridge, Lethbridge, AB, Canada

² Department of Educational and Counselling Psychology, McGill University, Montreal, QC, Canada

³ Centre for the Study of Learning and Performance, Concordia University, Montreal, QC, Canada

Edited by:

Nicola Pitchford, University of Nottingham, UK

Reviewed by:

Natalia Kucirkova, The Open University, UK

Charles Crook, University of Nottingham, UK

***Correspondence:**

Robert S. Savage, Department of Educational and Counselling Psychology, McGill University, 3700 McTavish, Montreal, QC, Canada
e-mail: robert.savage@mcgill.ca

The present paper reports a cluster randomized control trial evaluation of teaching using ABRACADABRA (ABRA), an evidence-based and web-based literacy intervention (<http://abralite.concordia.ca>) with 107 kindergarten and 96 grade 1 children in 24 classes (12 intervention 12 control classes) from all 12 elementary schools in one school district in Canada. Children in the intervention condition received 10–12 h of whole class instruction using ABRA between pre- and post-test. Hierarchical linear modeling of post-test results showed significant gains in letter-sound knowledge for intervention classrooms over control classrooms. In addition, medium effect sizes were evident for three of five outcome measures favoring the intervention: letter-sound knowledge ($d = +0.66$), phonological blending ($d = +0.52$), and word reading ($d = +0.52$), over effect sizes for regular teaching. It is concluded that regular teaching with ABRA technology adds significantly to literacy in the early elementary years.

Keywords: randomized controlled trial, reading development, web applications, internet, intervention, elementary school education

A cluster randomized control field trial of the ABRACADABRA web-based reading technology: replication and extension of basic findings

Noella A. Piquette¹, Robert S. Savage^{2*} and Philip C. Abrami³

¹ Faculty of Education, University of Lethbridge, Lethbridge, AB, Canada

² Department of Educational and Counselling Psychology, McGill University, Montreal, QC, Canada

³ Centre for the Study of Learning and Performance, Concordia University, Montreal, QC, Canada

Edited by:

Nicola Pitchford, University of Nottingham, UK

Reviewed by:

Natalia Kucirkova, The Open University, UK

Charles Crook, University of Nottingham, UK

Correspondence:

*Correspondence:

Robert S. Savage, Department of Educational and Counselling Psychology, McGill University, 3700 McTavish, Montreal, QC, Canada
e-mail: robert.savage@mcgill.ca

The present paper reports a cluster randomized control trial evaluation of teaching using ABRACADABRA (ABRA), an evidence-based and web-based literacy intervention (<http://abralite.concordia.ca>) with 107 kindergarten and 96 grade 1 children in 24 classes (12 intervention 12 control classes) from all 12 elementary schools in one school district in Canada. Children in the intervention condition received 10–12 h of whole class instruction using ABRA between pre- and post-test. Hierarchical linear modeling of post-test results showed significant gains in letter-sound knowledge for intervention classrooms over control classrooms. In addition, medium effect sizes were evident for three of five outcome measures favoring the intervention: letter-sound knowledge ($d = +0.66$), phonological blending ($d = +0.52$), and word reading ($d = +0.52$), over effect sizes for regular teaching. It is concluded that regular teaching with ABRA technology adds significantly to literacy in the early elementary years.

Keywords: randomized controlled trial, reading development, web applications, internet, intervention, elementary school education

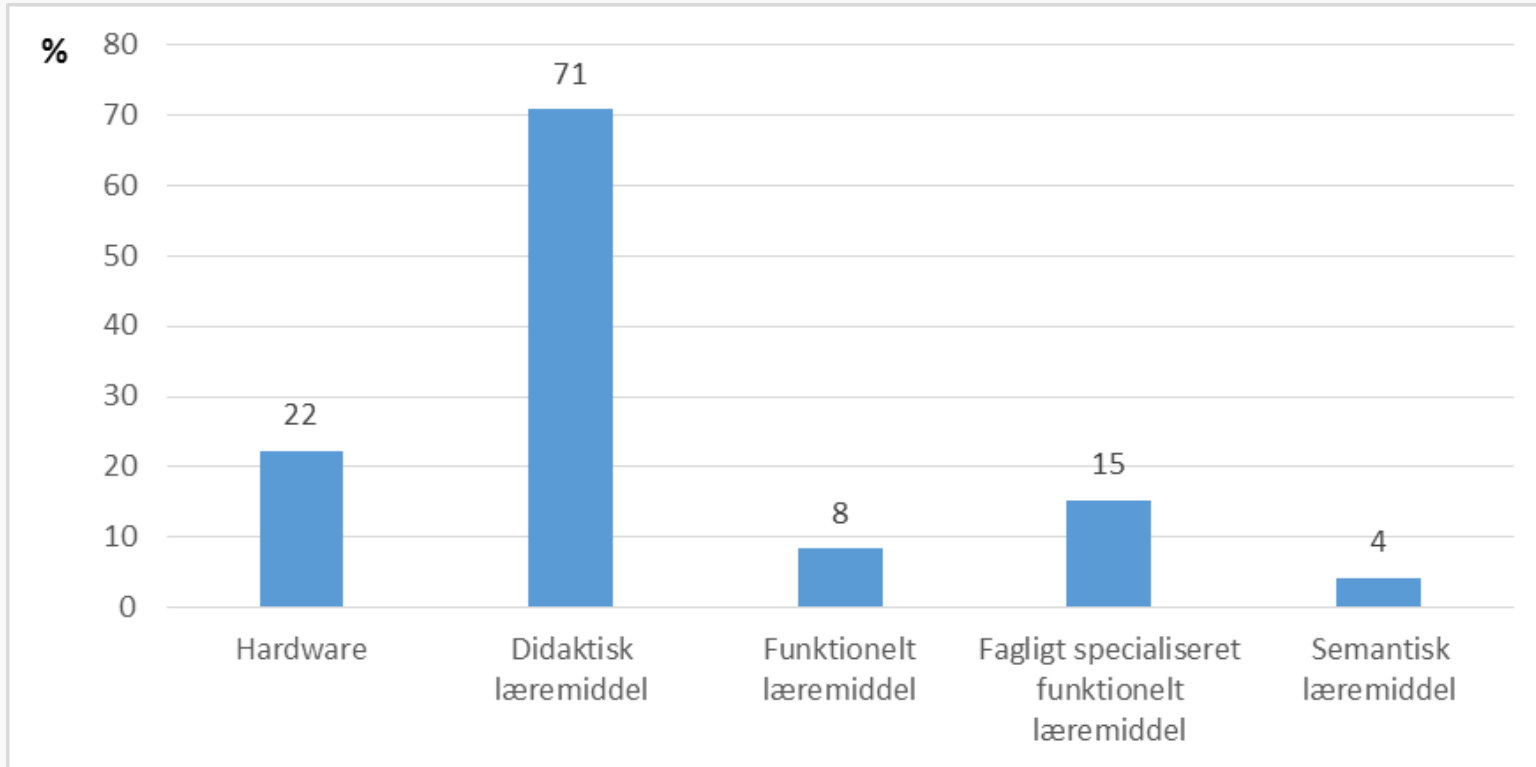
Didaktisk
læremiddel

Mange elever

Færdighedstest

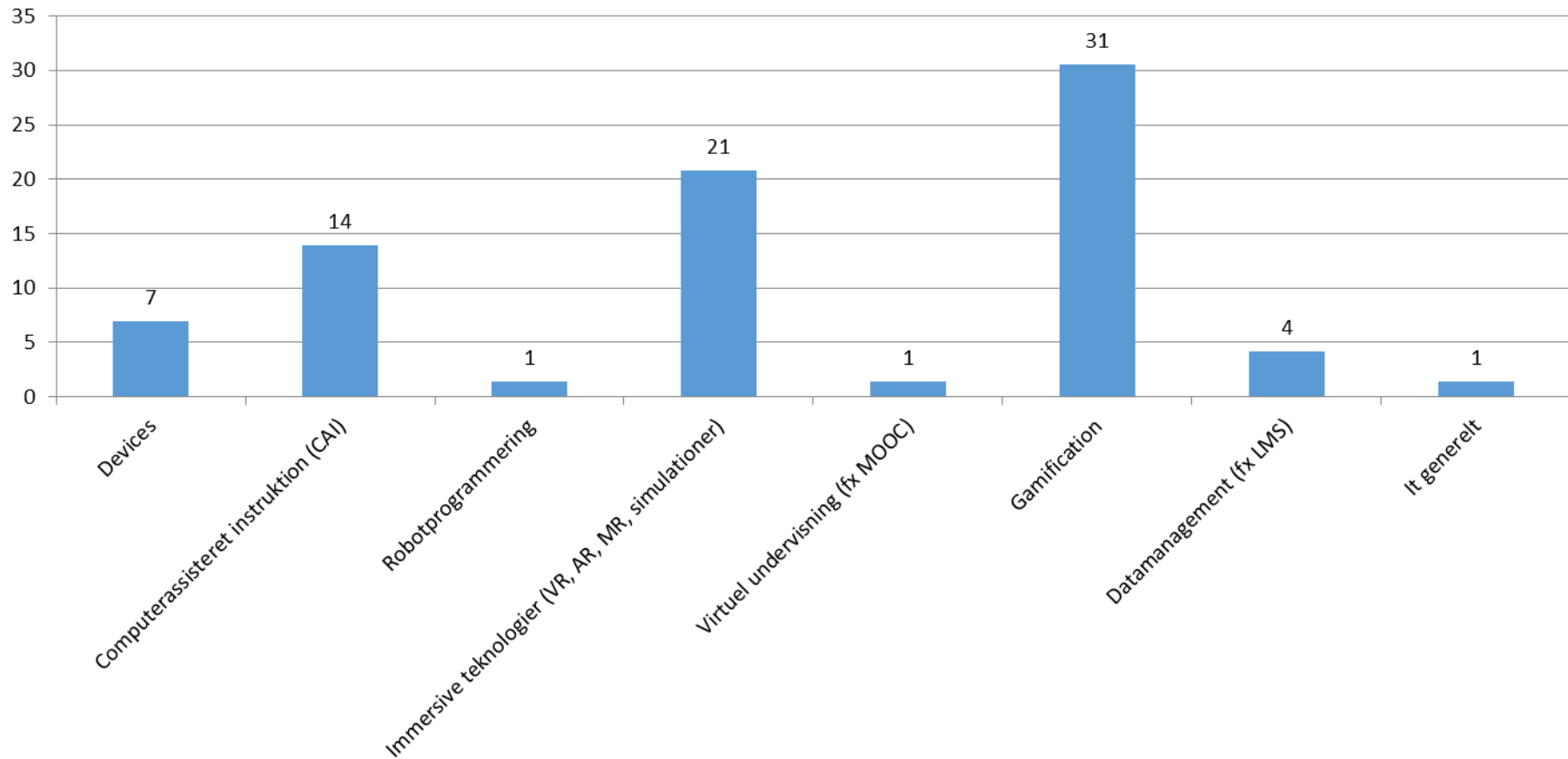
Effektstørrelse –
og ikke andre foki

Hvilken form for it undersøges?



%

Fundne teknologityper



4 prototyper på studier

#1: Randomiseret, kontrolleret eksperiment, der oftest måler effekt af et didaktisk læremiddel.

#2: **Teknik uden didaktisering.**

#3:

#4:

AN EVALUATION OF THE IMPACT OF 1:1 LAPTOPS ON STUDENT ATTAINMENT IN SENIOR HIGH SCHOOL SCIENCES

Simon Crook^a, Manjula D. Sharma^a, Rachel Wilson^b

Presenting Author: Rachel Wilson (rachel.wilson@sydney.edu.au)

Corresponding Author: Simon Crook (simon@simoncrook.com)

^aSchool of Physics, University of Sydney, Camperdown NSW 2006, Australia

^bFaculty of Education & Social Work, University of Sydney, Camperdown NSW 2006, Australia

KEYWORDS: 1:1 laptops, Australia, digital education revolution, science education, student attainment

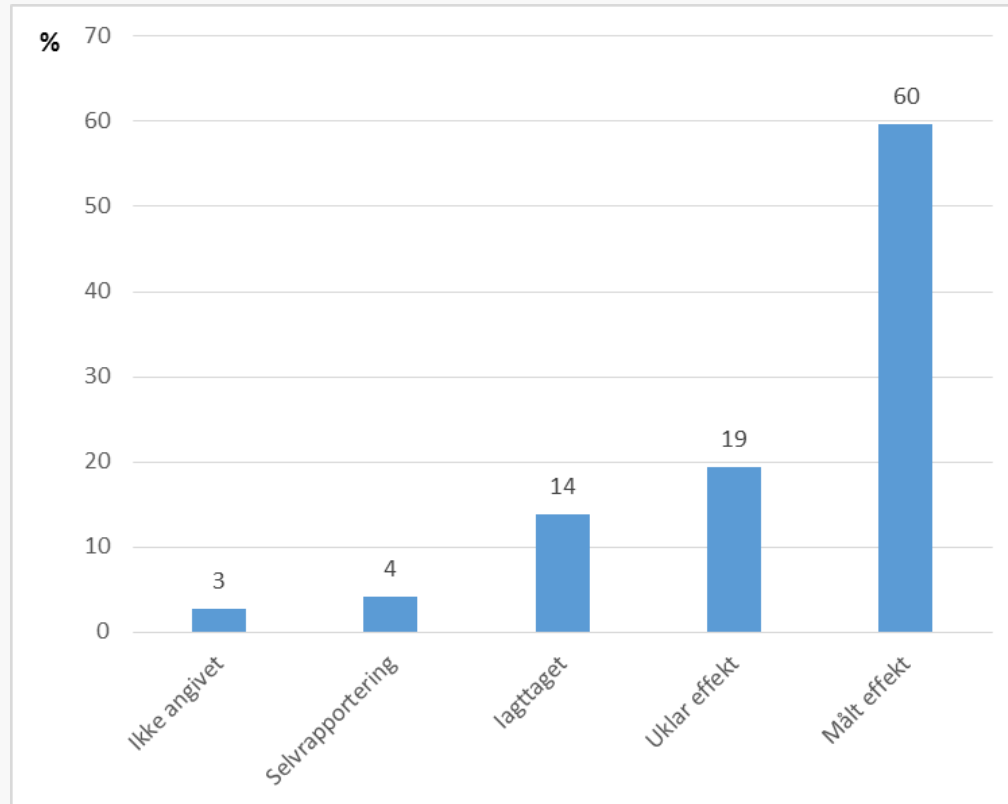
ABSTRACT

Billions of dollars are being spent across the world on providing schools and students with various technologies, such as 1:1 laptops. However, there is very little research of the impact of such implementations on student attainment, using in-depth, quantitative analyses of large sample sizes and standardized high-stakes examination scores, particularly in the sciences. Our study capitalized on a unique natural experiment rather than a researcher- designed, randomized experiment whereby, thanks to the Australian Government's Digital Education Revolution, half of grade 9 students in 2008 received laptops and half did not.

Resultat af 1:1 laptops AUS

- We found that being schooled with 1:1 laptops had statistically significant, positive correlation coefficients with student attainment, with a medium effect size in physics (0.38), and small effect sizes in biology (0.26) and chemistry (0.23).
- Upon further investigation, exploring data provided by student and teacher questionnaires, we found that the greater effect size in physics corresponded with greater use of simulations and spreadsheets by students and teachers.

Kilder til afdækning af virkning



4 prototyper på studier

#1: Randomiseret, kontrolleret eksperiment, der måler effekt af et didaktisk læremiddel.

#2: Teknik uden didaktisering.

#3: Teknologisk baseret didaktisk grundforskning.

#4:

Constructing liminal blends in a collaborative augmented-reality learning environment

Noel Enyedy • Joshua A. Danish • David DeLiema

Received: 5 June 2014 / Accepted: 13 January 2015 / Published online: 14 February 2015

© International Society of the Learning Sciences, Inc. 2015

Abstract In vision-based augmented-reality (AR) environments, users view the physical world through a video feed or device that *augments* the display with a graphical or informational overlay. Our goal in this manuscript is to ask *how* and *why* these new technologies create opportunities for learning. We suggest that AR is uniquely positioned to support learning through its ability to support students in developing “conceptual blends”—which we propose extend beyond cognitive spaces to include the layering of multiple ideas and physical materials, often supplied by different conversation participants. We document one case study and trace how the narrative structure of a board game, the physical floor materials (e.g. linoleum), a student’s first-person embodied experiences, the third-person live camera feed, and the augmented-reality symbols become integrated in the activity. As a result, students’ conceptualization of force and friction become fused with a diverse set of intellectual resources. We

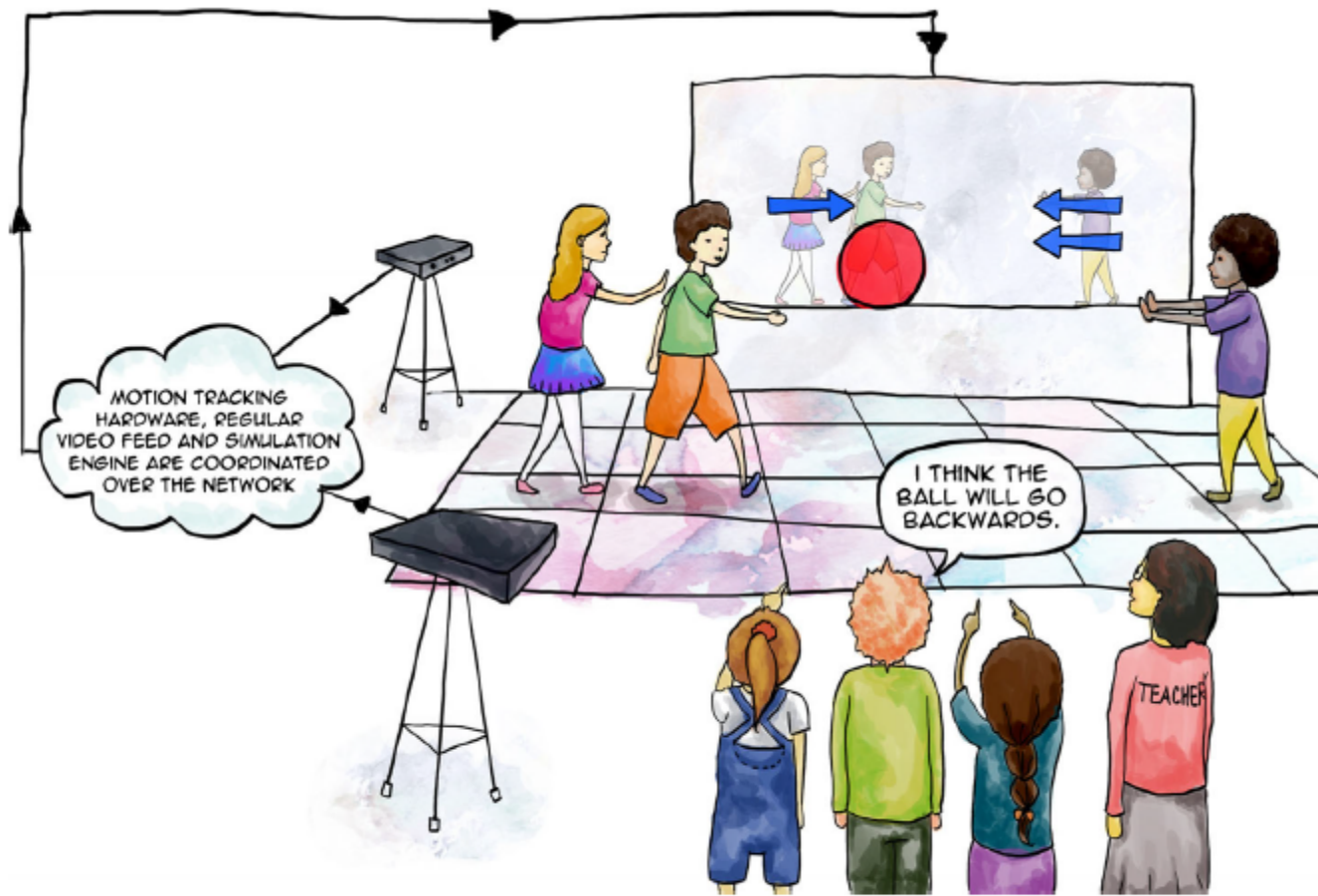


Fig. 1 In this microworld, students predict with their bodies the effects of force and friction and then compare their prediction with the visual, Newtonian simulation of a ball experiencing that same amount of force and friction

Constructing liminal blends in a collaborative augmented-reality learning environment

Kompleks
intervention

Noel Enyedy • Joshua A. Danish • David DeLiema

Received: 5 June 2014 / Accepted: 13 January 2015 / Published online: 14 February 2015

© International Society of the Learning Sciences, Inc. 2015

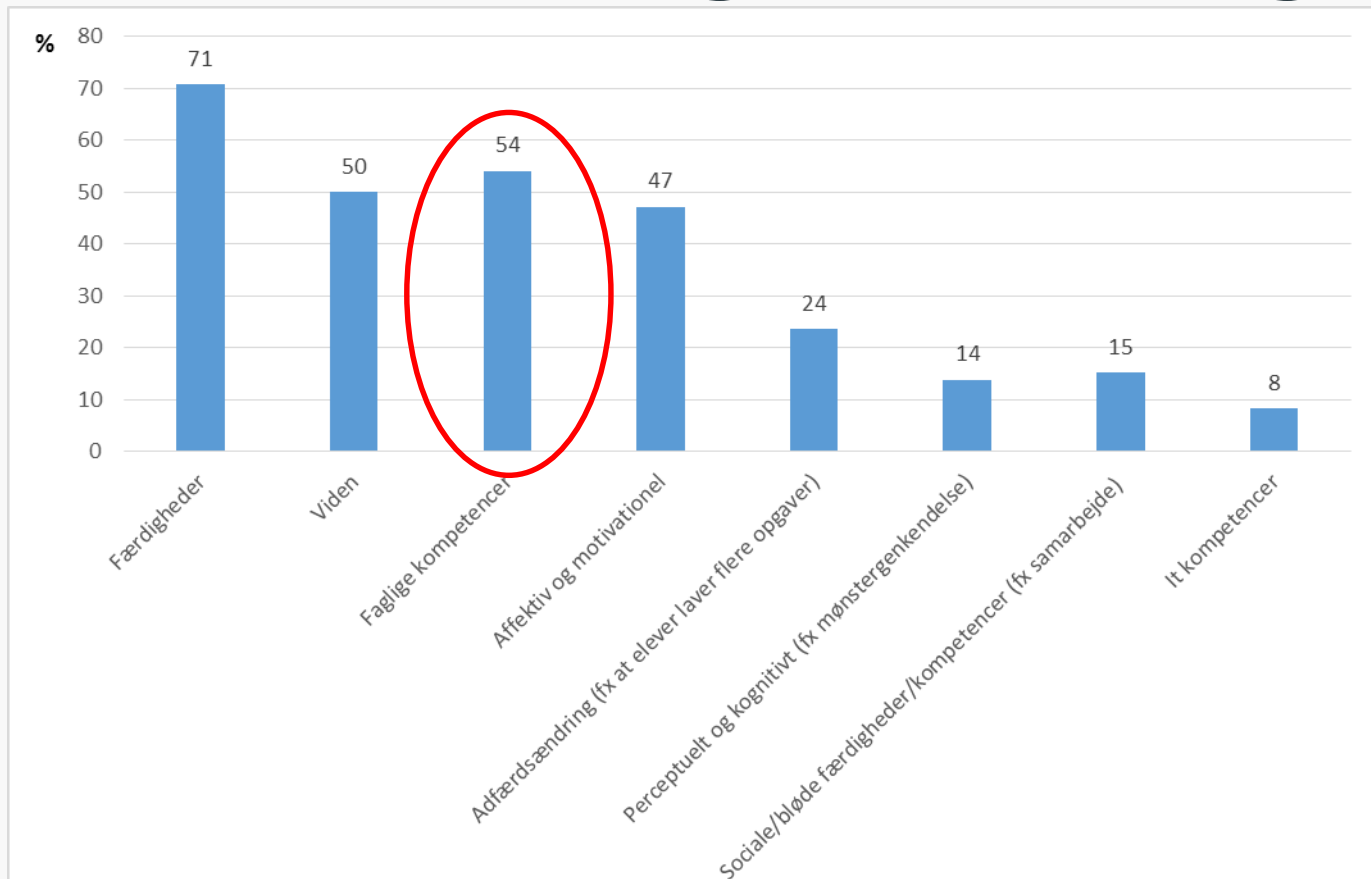
Abstract In vision-based augmented-reality (AR) environments, users view the physical world through a video feed or device that *augments* the display with a graphical or informational overlay. Our goal in this manuscript is to ask *how* and *why* these new technologies create opportunities for learning. We suggest that AR is uniquely positioned to support learning through its ability to support students in developing “conceptual blends”—which we propose extend beyond cognitive spaces to include the layering of multiple ideas and physical materials, often supplied by different conversation participants. We document one case study and trace how the narrative structure of a board game, the physical floor materials (e.g. linoleum), a student’s first-person embodied experiences, the third-person live camera feed, and the augmented-reality symbols become integrated in the activity. As a result, students’ conceptualization of force and friction become fused with a diverse set of intellectual resources. We

Eksplorativt

Kompleks læring

Kvalitativt

Hvilken virkning undersøges? ³⁹



4 prototyper på studier


#1: Randomiseret, kontrolleret eksperiment, der måler effekt af et didaktisk læremiddel.

#2: Teknik uden didaktisering.

#3: Teknologisk baseret didaktisk grundforskning.

#4: **Computermedieret stilladsring.**

An ethnomethodological perspective on how middle school students addressed a water quality problem

Brian R. Belland¹  · Jianguye Gu¹ · Nam Ju Kim¹ · David J. Turner¹

Abstract Science educators increasingly call for students to address authentic scientific problems in science class. One form of authentic science problem—socioscientific issue—requires that students engage in complex reasoning by considering both scientific and social implications of problems. Computer-based scaffolding can support this process by giving students structure but also helping them focus on important problem elements. In this multiple case study from the ethnomethodological framework, we investigated how 7th-grade students from five small groups worked together to evaluate the credibility of evidence, make sense of data and evidence, and address a problem related to water quality in their local river. Data sources included video of students engaging in the unit, prompted interviews, database information, log data, and documents collected from computers. Results indicated that overall, the experimental small groups demonstrated more sophisticated epistemic beliefs and a more effective approach to solving the problem than the control small groups.

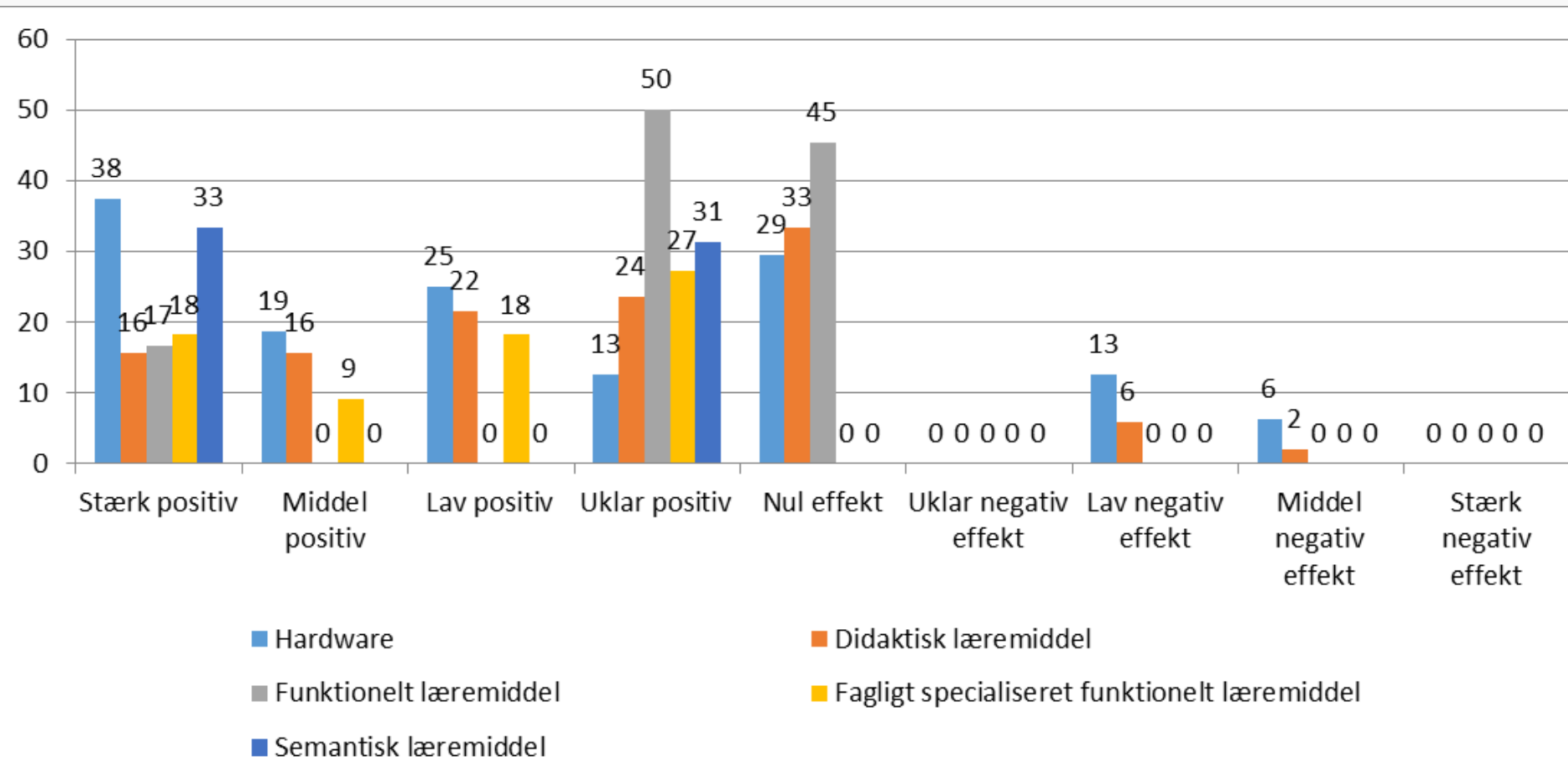
Keywords Scaffolding · Argumentation · Problem-based learning · Socioscientific issues

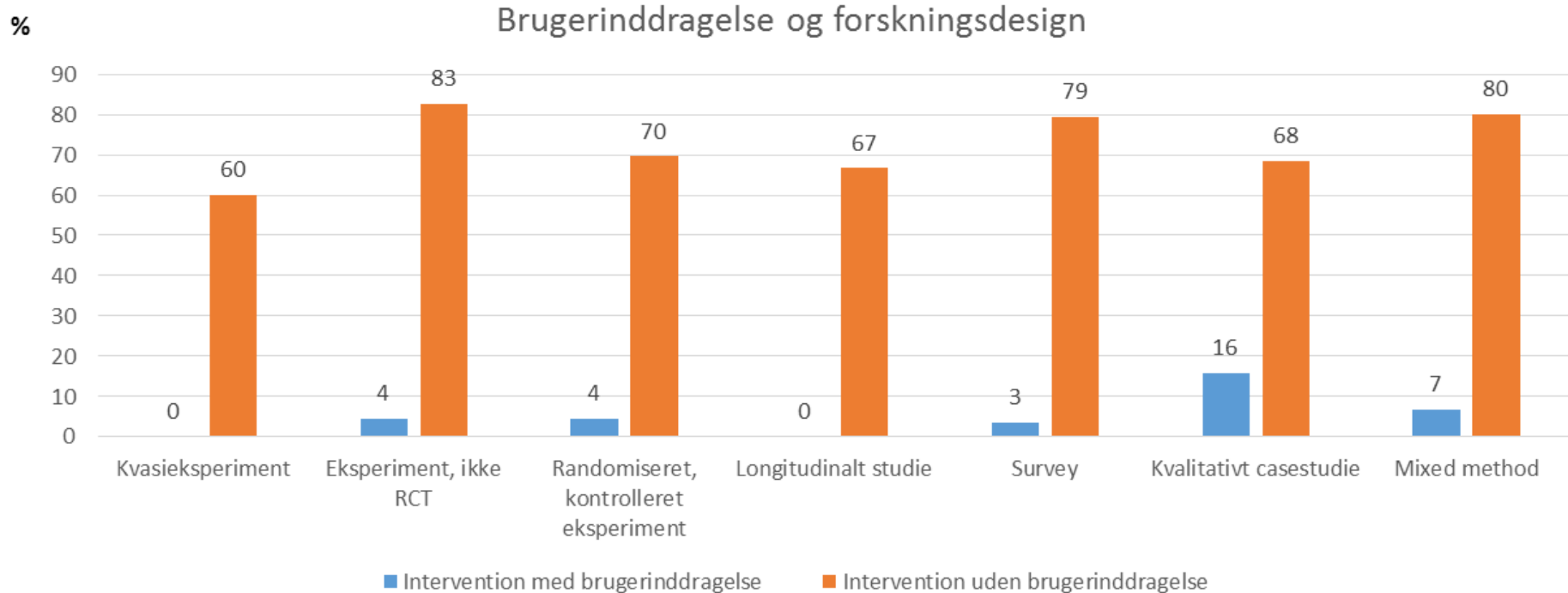
Højt taksonomisk niveau.
Kompetence.

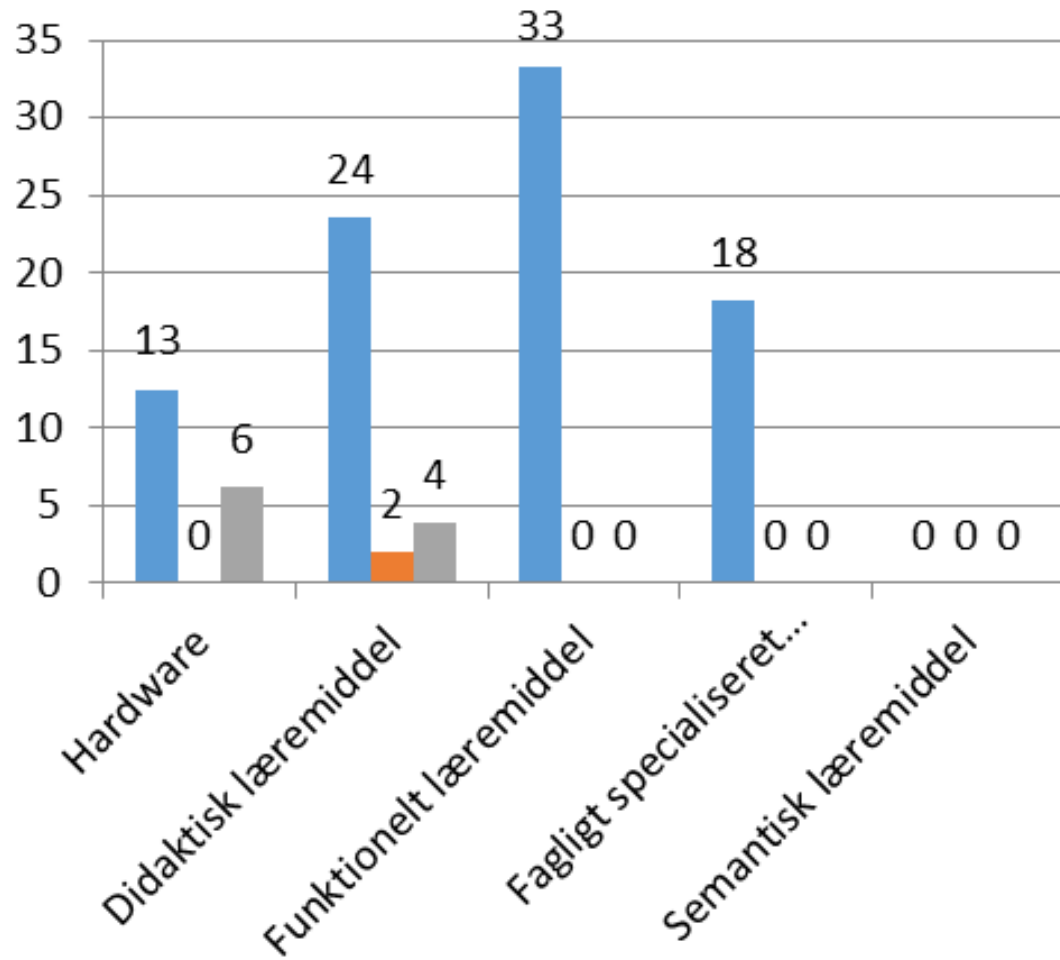
Kvalitativt.
Casestudie.

Tykke beskrivelser. Flere datakilder

Teoridrevet dataanalyse.







- lagttaget positiv effekt
- lagttaget nul-effekt
- lagttaget negativ effekt

Perspektiv

Behov for en mere sofistikeret forståelse *af* og effektforskning *i* didaktisk brug af teknologi

Hvad er hensigtsmæssigt?

- **Fagligt nærvær i undervisningen**
jeg-du, her-nu, faglig opmærksomhed, fordybelsens dramaturgi...
- **Alt andet bør i udgangspunktet være slukket**
teknologier, konflikter, udeståender...
- **Alt andet bør være sat i parentes**
social baggrund, hierarkier, forforståelse...
- **Teknologier tændes, når de anvendes til**
at åbne eleven for verden, og verden for eleven!

Granulering af effektspørgsmålet

- **Virkningskontekst:** Hvilken teknologi, hvordan, for hvem, hvorfor og under hvilke omstændigheder.
- **Indsatsniveauer:** Fler- eller enkeltstrengede indsatser i forhold til forskellige faktorer.
- **Virkningsniveauer:** Effekter og virkningssammenhænge på og mellem makro-, meso- og mikroniveau.
- **Didaktiseringsgrad:** Graden af didaktisk-teknologisk stilladsering af elever, lærere, vejledere og ledelse.
- **Didaktiseringsmåde:** Den didaktiske variation af mål, indhold, metoder og teknologibrug i undervisningen.
- **It-didaktisk elementarisering:** Forholdet mellem didaktikudvikling og teknologiudvikling.

Nyhedsbrev fra Læremiddel.dk

- Generelle nyheder fra Læremiddel.dk
- Inspiration til praktikere
- Tidsskriftet Learning Tech



laeremiddel.dk/tilmeld-nyhedsbrev