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MARCUS SPECHT
PROFESSOR DIGITAL EDUCATION
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Leiden•Delft•Erasmus
Centre for Education and Learning

Universiteit Leiden The Netherlands

TU Delft Delft University of Technology

Erasmus University Rotterdam

DATA ENHANCED LEARNING!

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#1 THE ROLE OF CURIOSITY AND **FEEDBACK** IN LEARNING

Balance Bike vs. Training Wheels

contrast & comparison to make the best decision

balance bike

VS.

	Training Wheels	Balance Bikes
Weight :	~ 20 lbs	4.9 lbs
Learning Curve:	Medium	Easy
Inflatable Tires:	✓	✓
Handbrake :	✓	✗
Teaches Balance:	✗	✓

LEARN TO BIKE

“TRAINING WHEELS ARE GREAT FOR LEARNING THE UNNATURAL SKILL OF PEDALLING. BUT AT THE SAME TIME TRAINING WHEELS CAN BE DETRIMENTAL IN LEARNING TO BALANCE.”

“BY CREATING THE ASSISTED BALANCE, TRAINING WHEELS ALSO CREATE AN ARTIFICIAL UNDERSTANDING OF BALANCE SPEED. THEY CAN ALSO MISLEAD THE RIDER BY SIMPLY REDUCING THE EFFORT IT TAKES TO RIDE A BICYCLE.”

https://www.bykbikes.com.au/the-pros-and-cons-of-using-training-wheels-when-learning-to-ride/

LEARNING WITH TEXT IS DIFFERENT TO LEARNING WITH

SIGN LANGUAGE

http://deaf-mentoring.de

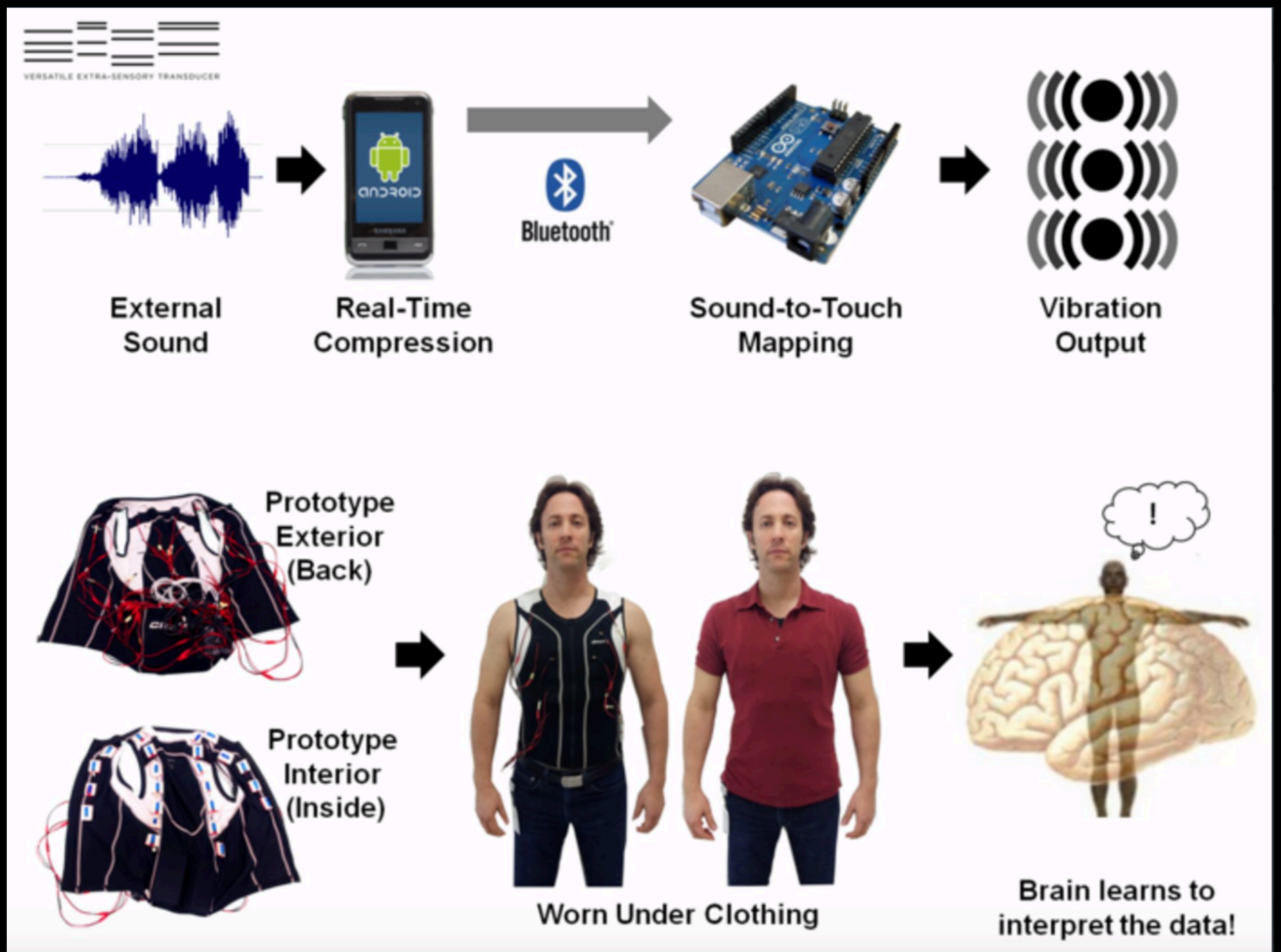
HEARING IMPAIRMENT HINDERS LEARNING TO SPEAK

“Only through **hearing** and **imitating speech** can children adapt their articulation, discover the meanings of words and ultimately learn how to construct sentences,” explains Christine Jones, Au.D., CCC-A, Director of Pediatric Clinical Research at Phonak.

However, **children with untreated hearing impairment don’t perceive auditory stimuli to a sufficient extent or fail to respond to them at all. This will severely delay their language acquisition and may even prevent them from ever learning to speak**. Deficiencies at this stage of development are extremely difficult to overcome later on. Children affected by this often experience problems with interpersonal communication and feel socially isolated.

THE BRAIN CAN LEARN TO INTERPRET DATA FROM DIFFERENT CHANNELS

SOUND TO VIBRATION



REAL-TIME FEEDBACK IS EFFICIENT FOR

BEHAVIOUR CHANGE

Goetz, T. (2011). Harnessing the Power of Feedback Loops | Magazine. *wired.com*. Retrieved August 22, 2011, from http://www.wired.com/magazine/2011/06/ff_feedbackloop/5/

#2 THE ROLE OF TECHNOLOGY

"The future is already here – it's just not evenly distributed.
The Economist, December 4, 2003"— William Gibson

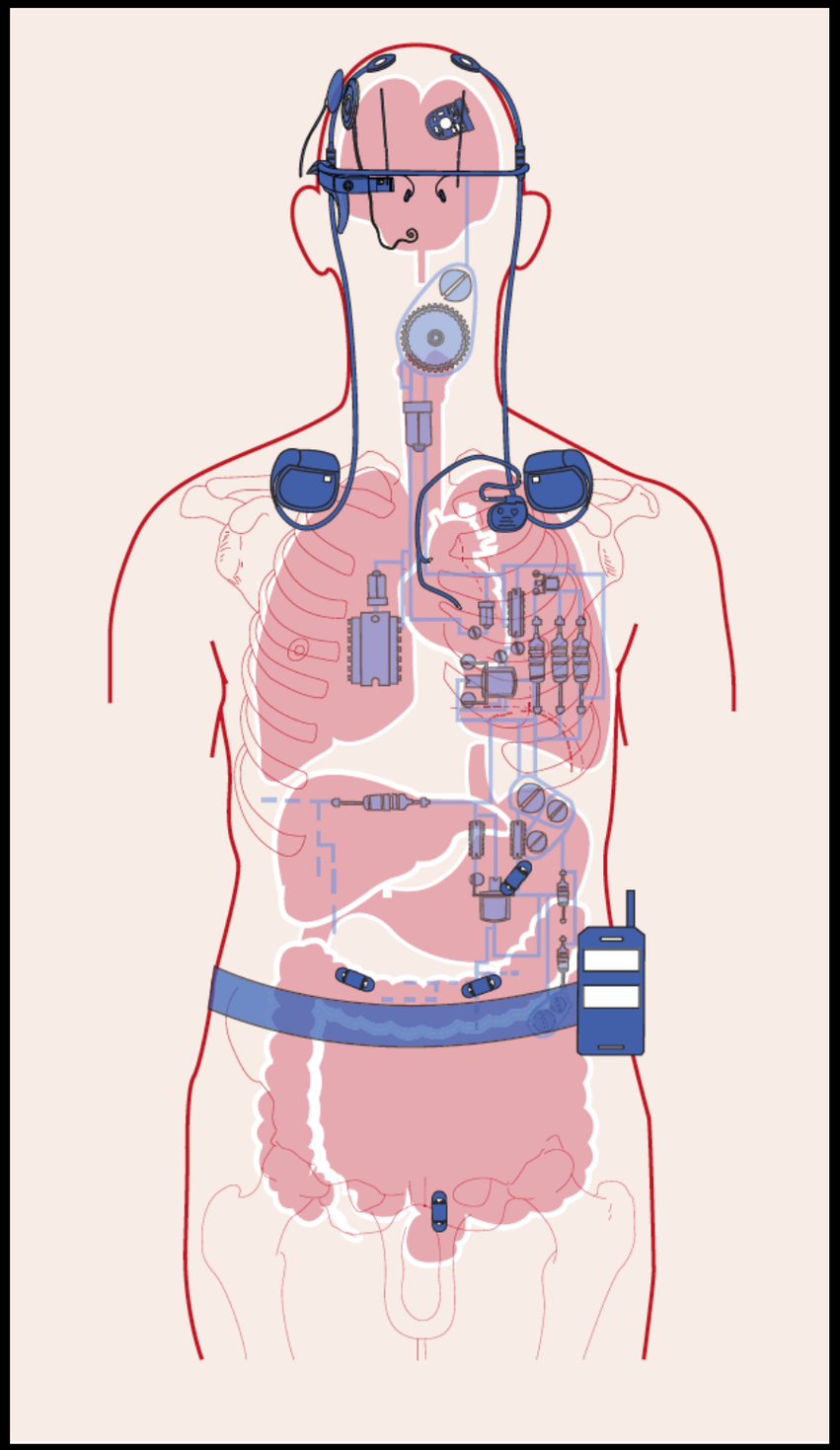
THE THINGS THAT MAKE ME WEAK AND STRANGE GET ENGINEERED AWAY

Cory Doctorow

http://craphound.com/category/walh/

INTIMATE TECHNOLOGY

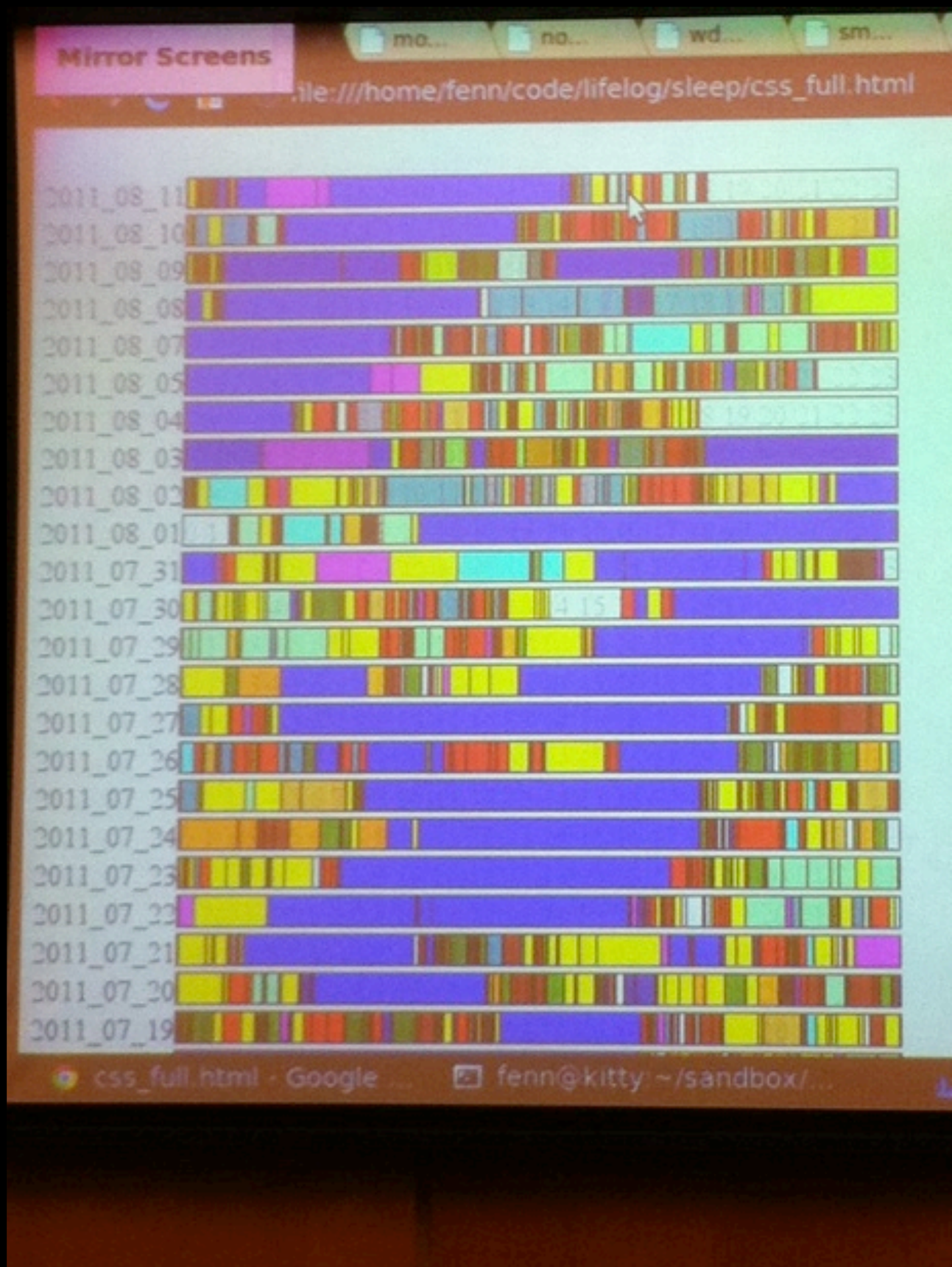
Technology integration into our daily live on personal, environmental and infrastructural level



Van Est, R., Rerimassie, V., van Keulen, I., & Dorren, G. (2014). Intimate technology. The battle for our body and behaviour. The Hague: Rathenau Instituut. Retrieved from https://pure.tue.nl/ws/files/3957297/60864960525118 6.pdf

THE QUANTIFED SELF

- Questioning
- Awareness
- Self Experimentation
- Measuring
- Data Collection
- Behaviour Change



#3 BUT WHAT ABOUT LEARNING?

DATA COLLECTION WITH PURPOSE !

	The Cognitive Process Dimension					
The Knowledge Dimension	1. ***Remember***	2. ***Understand***	3. ***Apply***	4. ***Analyze***	5. ***Evaluate***	6. ***Create***
A. ***Factual Knowledge***						
B. ***Conceptual Knowledge***				X		X
C. ***Procedural Knowledge***						
D. ***Metacognitive Knowledge***						

Figure 1. The placement in the Taxonomy Table of the State of Minnesota's Language Arts Standard for Grade 12.

Krathwohl, D. R. (2002). A revision of Bloom's taxonomy: An overview. Theory into Practice. https://doi.org/10.1207/s15430421tip4104_2

#4 DESIGNING ENHANCED LEARNING FROM DATA

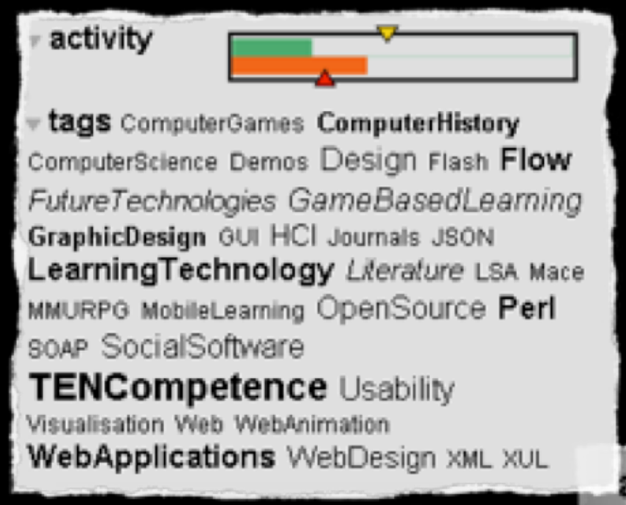
METHODS FOR ENHANCING #1

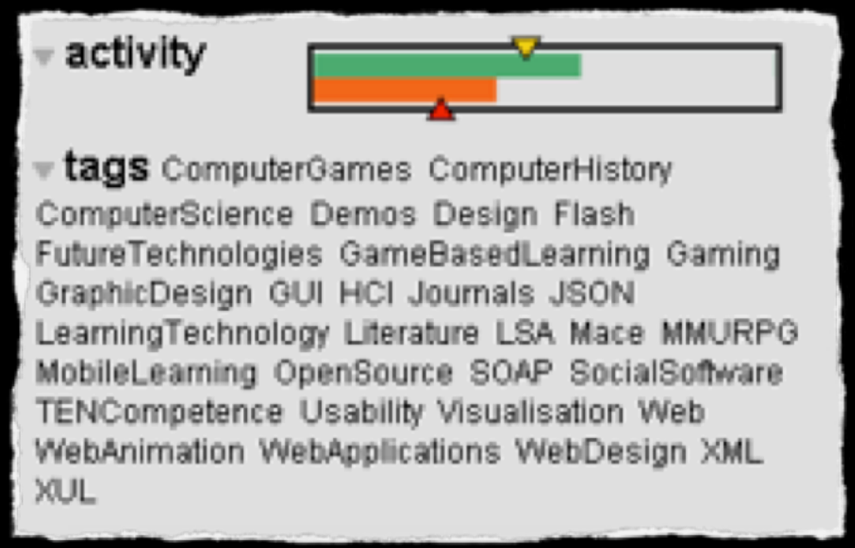
- **Repetition** and **testing** (Learning Strategies) for knowledge based on tracking data, introduction of solutions linked to analytics in school materials

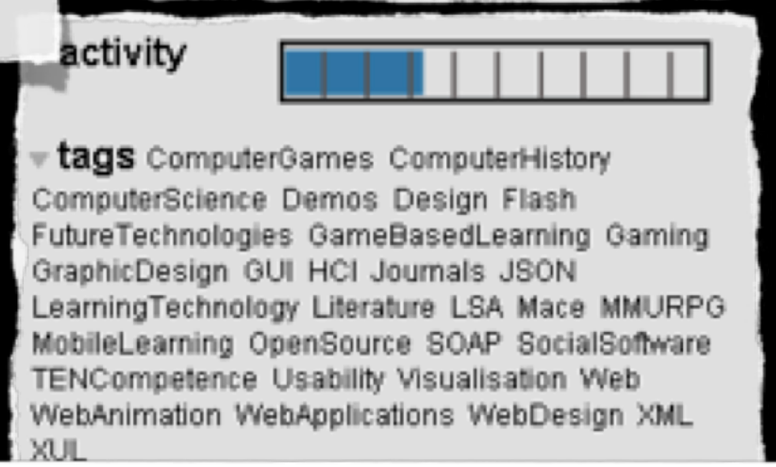
- **Reflection** on personal data and performance of others to support metacognitive development, also development of SRL skills based on data

- Using VR/AR for expertise development in situ, **real-time feedback** based on sensor data or **expert-models**

TRACKING DATA FOR PERSONAL REFLECTION ...







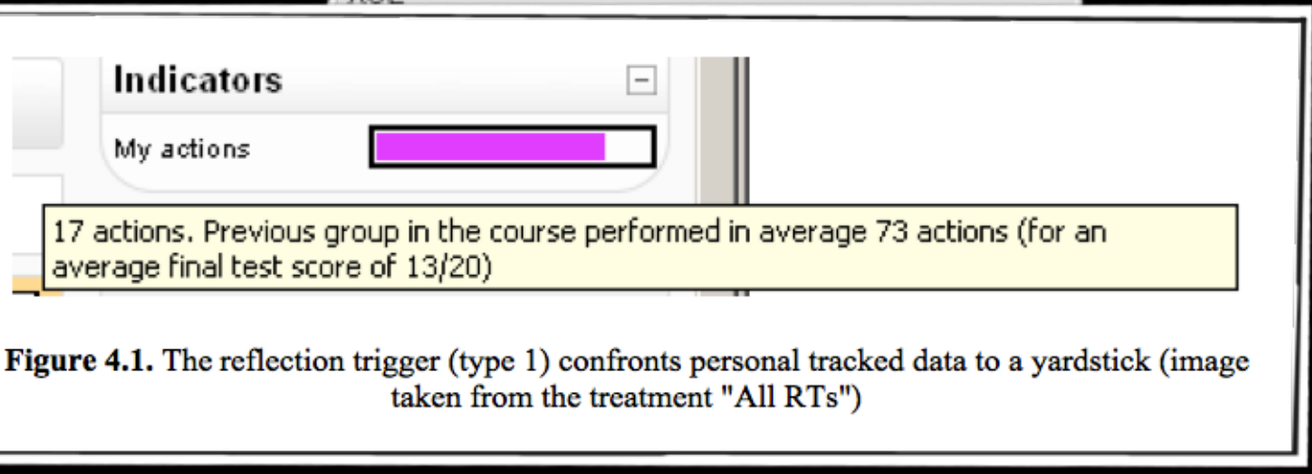


Figure 4.1. The reflection trigger (type 1) confronts personal tracked data to a yardstick (image taken from the treatment "All RTs")

Lifelong Learning Hub

B2 level in Dutch 22/08/2014

B2 level in Dutch 22/08/2014

Tap to start/stop a learning activity

nfc

Bernardo Tabuenca. Welten Institute.

HTTPS://WWW.YOUTUBE.COM/WATCH?V=RL-JAII4IN8

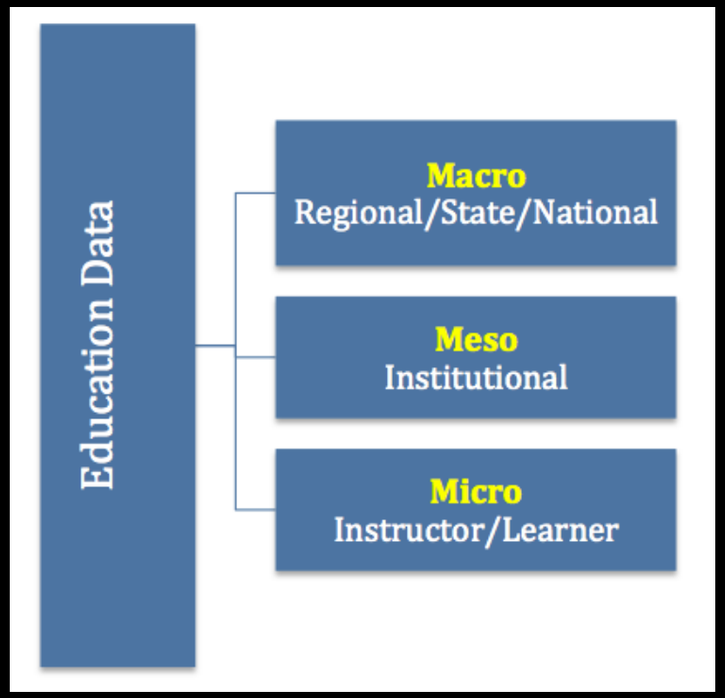
mobile LA trackers …

SENSOR DATA AND REAL-TIME

AWARD - ACM MULTIMODAL INTERACTION 2015

BEST DEMO AWARD - ECTEL 2015

LA IMPLEMENTATION FOR DIFFERENT PURPOSES AND GDPR AS AN OPPORTUNITY



D **DETERMINATION** – Why you want to apply Learning Analytics?
- What is the added value (Organisational and data subjects)?
- What are the rights of the data subjects (e.g., EU Directive 95/46/EC)

E **EXPLAIN** – Be open about your intentions and objectives
- What data will be collected for which purpose?
- How long will this data be stored?
- Who has access to the data?

L **LEGITIMATE** – Why you are allowed to have the data?
- Which data sources you have already (aren't they enough)?
- Why are you allowed to collect additional data?

I **INVOLVE** – Involve all stakeholders and the data subjects
- Be open about privacy concerns (of data subjects)
- Provide access to the personal data collected (about the data subjects)
- Training and qualification of staff

C **CONSENT** – Make a contract with the data subjects
- Ask for a consent from the data subjects before the data collection
- Define clear and understandable consent questions (Yes / No options)
- Offer the possibility to opt-out of the data collection without consequences

A **ANONYMISE** – Make the individual not retrievable
- Anonymise the data as far as possible
- Aggregate data to generate abstract metadata models (Those do not fall under EU Directive 95/46/EC)

T **TECHNICAL** – Procedures to guarantee privacy
- Monitor regularly who has access to the data
- If the analytics change, update the privacy regulations (new consent needed)
- Make sure the data storage fulfills international security standards

E **EXTERNAL** – If you work with external providers
- Make sure they also fulfil the national and organisational rules
- Sign a contract that clearly states responsibilities for data security
- Data should only be used for the intended services and no other purposes

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- Drachsler, H., & Greller, W. (2016, April). Privacy and analytics: it's a DELICATE issue a checklist for trusted learning analytics. In Proceedings of the sixth international conference on learning analytics & knowledge (pp. 89-98). ACM.

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THANK YOU !

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