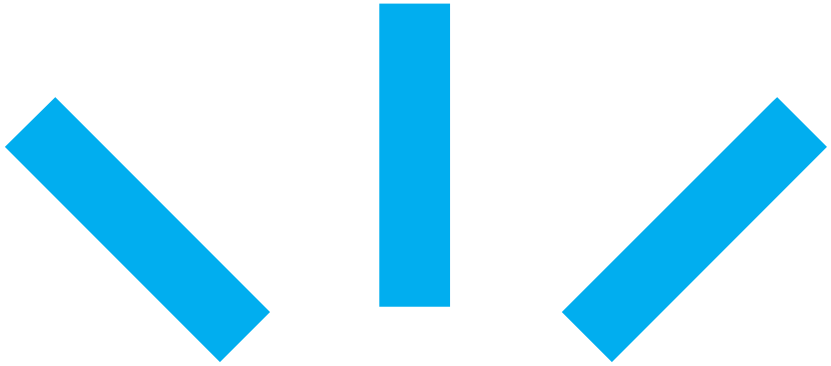


Co-evolution of human capabilities and intelligent technologies

Professor Sanna Järvelä
Learning and Educational Technology Research Unit (LET)
Department of Education
University of Oulu, Finland

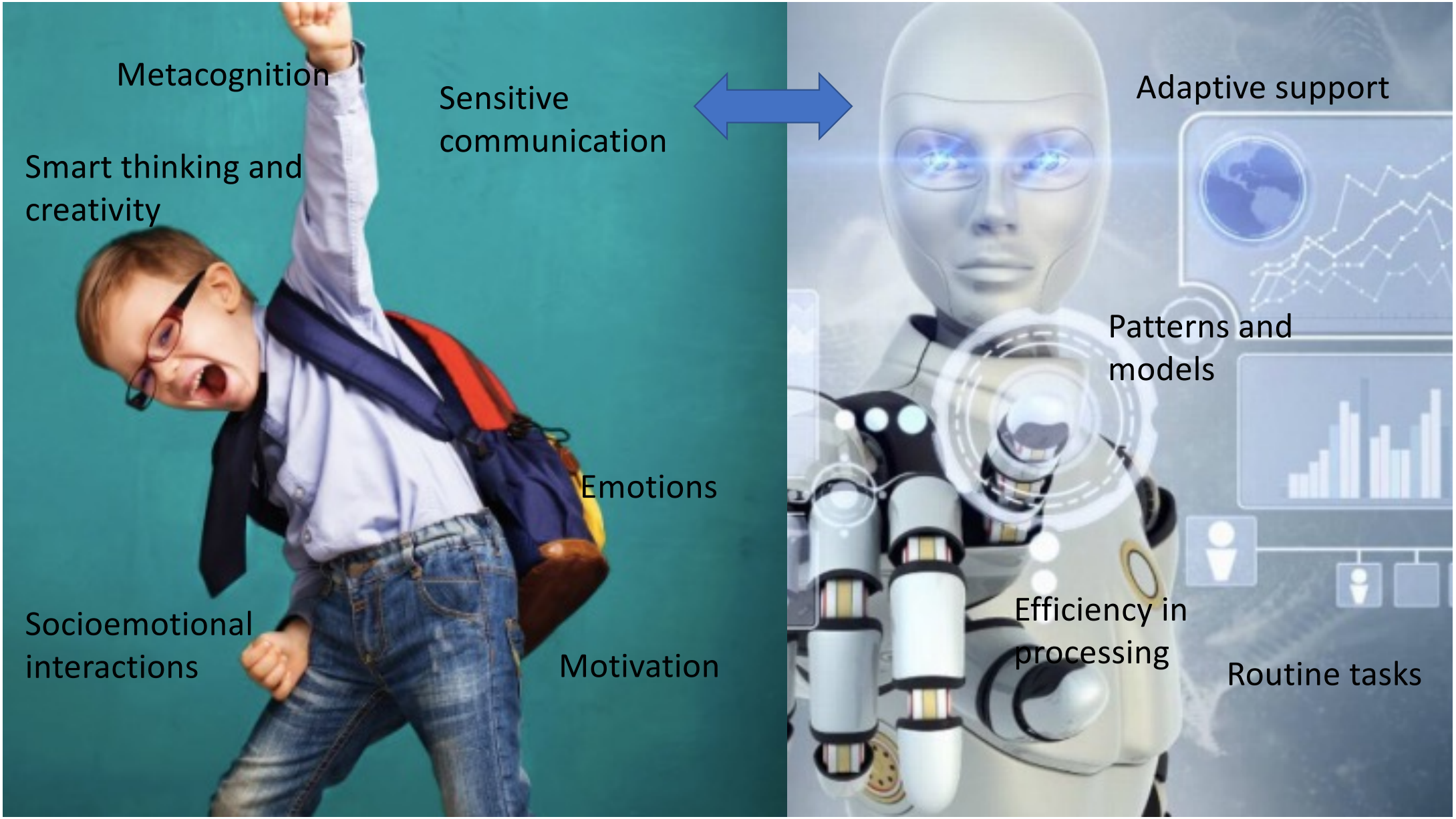
In my talk

What kind of skills and competences are needed for the future?

What is important in human learning?

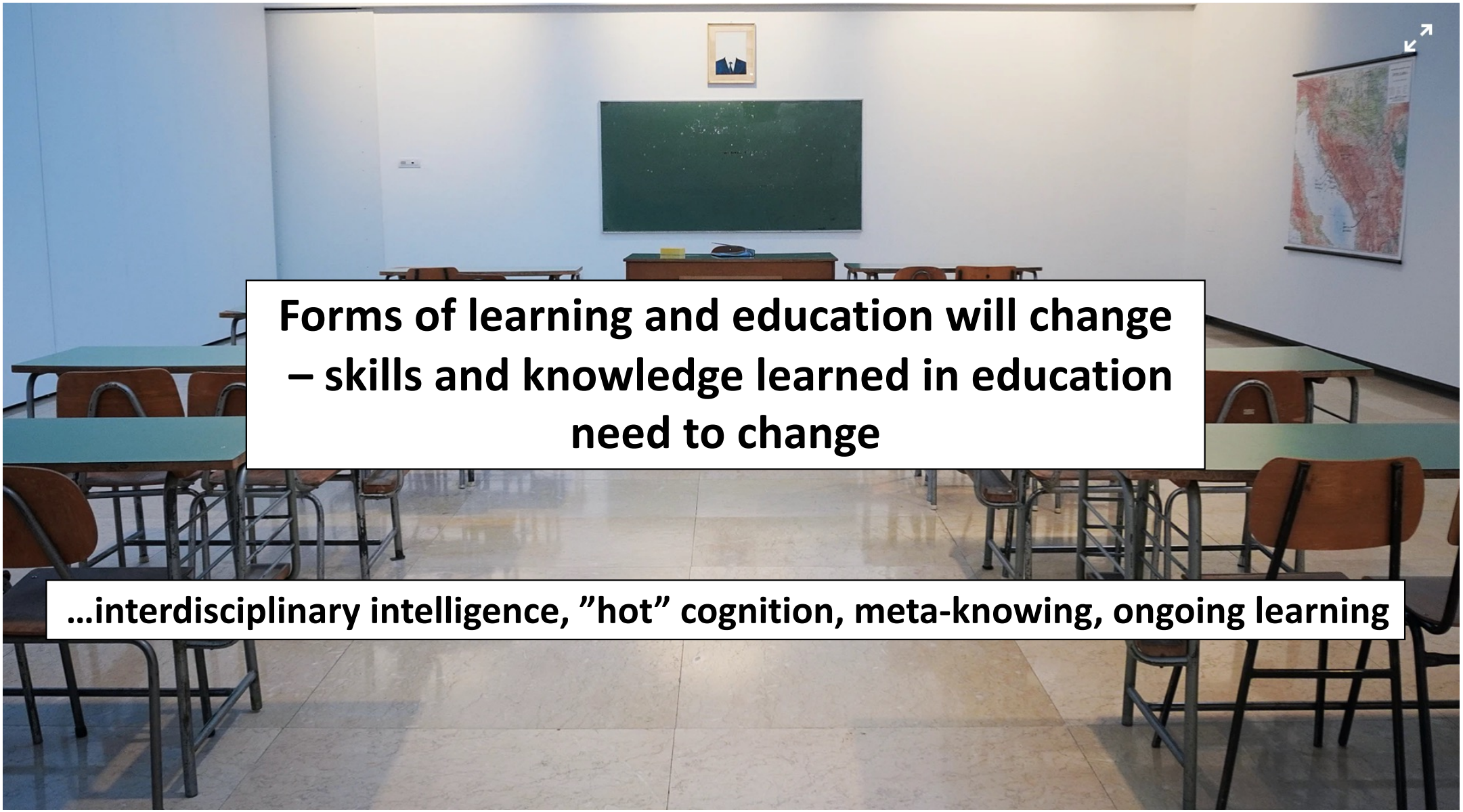
Socially shared regulation in learning

How human sciences can shape digitalization?

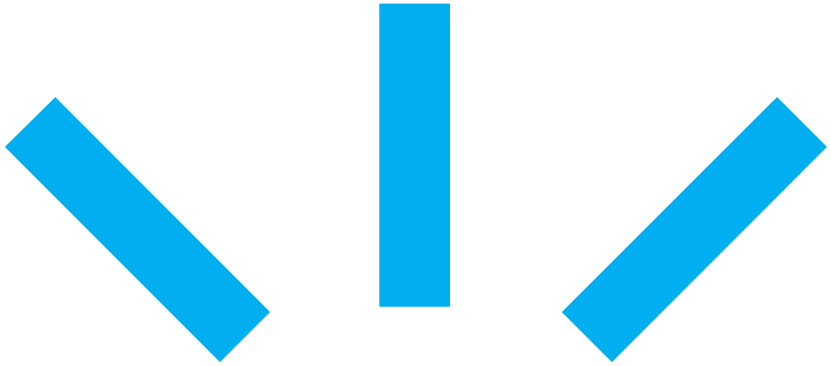

Metacognition
Sensitive communication
Smart thinking and creativity
Emotions
Socioemotional interactions
Motivation
Adaptive support
Patterns and models
Efficiency in processing
Routine tasks

How and what to educate and train in an uncertain and complex world for a future we can't predict ?

Covid19 is not only health crisis, but global work and educational crisis, *deepening the continuous learning needs* (OECD, 2020).


Forms of learning and education will change – skills and knowledge learned in education need to change
…interdisciplinary intelligence, ”hot” cognition, meta-knowing, ongoing learning


What is critical for learning success in 21st century?
(a) ability to adapt to new situations and challenges and engage in complex problem solving
(b) social skills necessary for communicating and collaborating productively and proficiently,
(c) socio-emotional skills and empathy necessary for tackling challenging problems, and
(d) ability to take initiative set goals and monitor self and others.
A new set of uniquely human skills and competencies that machines cannot match or replicate will be necessary.



What is important in human learning?
SSRL

Learners can monitor and regulate their learning

"experimenting with your learning"

M e t a c o g n i t i o n

scanning internal and external factors - goals and plans - activating the plans - re-examine to adapt

What is self-regulated learning?

(Winne & Hadwin, 1998; Zimmerman 2010; Järvelä, Hadwin, Malmberg & Miller, 2018)

Active and proactive learning

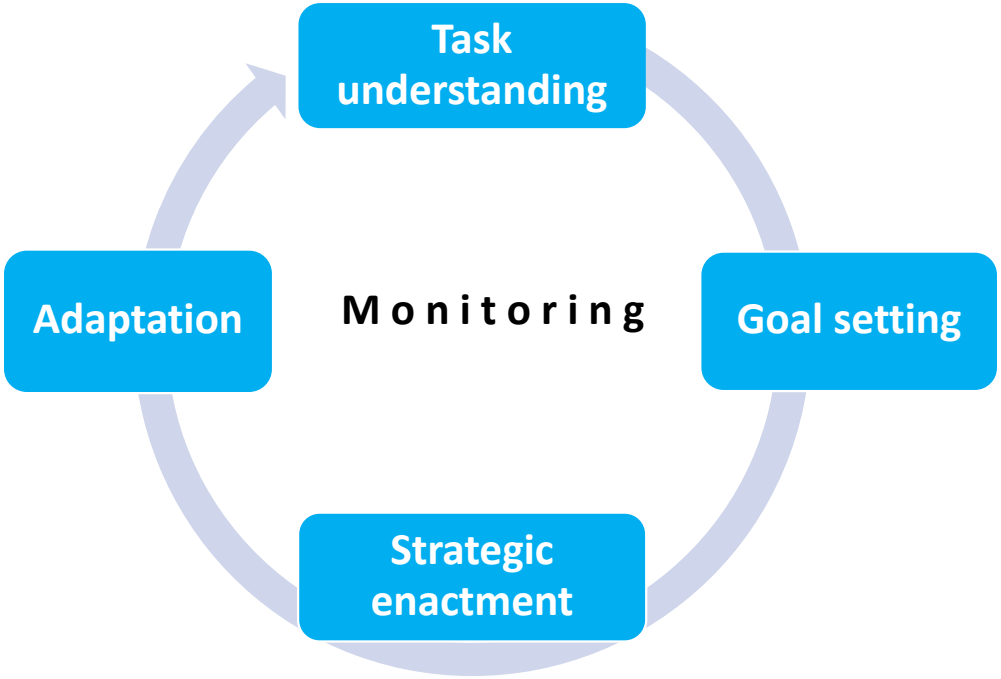
Process of learning to monitor, evaluate, and regulate (or change) your own

- Thinking
- Motivation
- Emotion
- Behaviour
- Learning

Adaptive process that <u>you</u> develop and refine over time

What is self-regulated learning?

(Winne & Hadwin, 1998; Zimmerman 2002)



SRL is an ability to be **strategic and make adaptive changes** in terms of cognition, motivation and emotions in challenging learning situations

Collaborative learning

Collaborative and socioemotional interactions, transactions and knowledge building processes have **temporal and multidimensional** nature which in the optimal cases are successfully **shared** in between the collaborating partners.

(Kirschner, Sweller, Kirschner & Zambrano, 2018)

Learning is a complex process

motivation

affect

cognition

emotion

metacognition

Successful collaboration requires

Achieving success in CL tasks depends upon:

(a) co-constructing shared task representations, shared goals, and shared strategies

(b) regulating learning through shared metacognitive monitoring and control of cognition, motivation, emotion and behavior

Järvelä, S., Hadwin, A.F,. Malmberg, J. & Miller. M. (2018). Contemporary Perspectives of Regulated Learning in Collaboration. In F. Fischer, C.E. Hmelo-Silver, Reimann, P. & S. R. Goldman (Eds.). *Handbook of the Learning Sciences*. Taylor & Francis.

Socially shared regulation (SSRL) involves groups taking metacognitive control of the task together through negotiated, iterative fine-tuning of cognitive, behavioral, motivational, and emotional conditions/states as needed

SSRL is

(a) **transactive**

multiple individual perspectives contribute to joint metacognitive, cognitive, behavioral, and motivational states

(a) **deeply metacognitive**

monitoring and evaluation are shared amongst people to drive negotiated adaptation

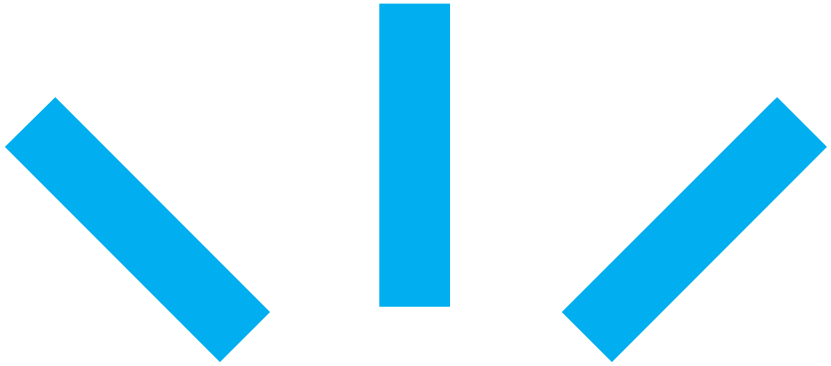
(a) **collectively agentic**

joint goals and standards are intentionally adopted and monitored together

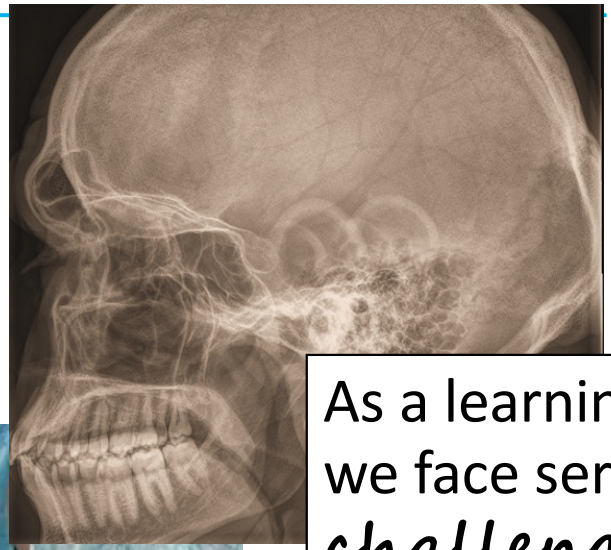
(a) **socio-historically and contextually situated**

individual and collective beliefs contribute

Hadwin, A. F., Järvelä, S., & Miller, M. (2018). Self-regulation, co-regulation and shared regulation in collaborative learning environments. In D. Schunk, & J. Greene (Eds.), *Handbook of Self-Regulation of Learning and Performance* (2nd ed., pp. 83–106). New York, NY: Routledge.



How intelligent technologies can be leveraged to understand SSRL?



As a learning scientists,
we face serious ***methodological challenges*** because the learner's cognition, motivation, and emotion are neither visible for the researcher to study it, nor for learners so that they are able to regulate those processes to learn effectively.

SRL in a digital world - Multimodal data collection

Järvelä, S. & Bannert, M. (2021). Temporal and adaptive processes of regulated learning – What can multimodal data tell? *Learning and Instruction*, 72

360-degree video capture + audio

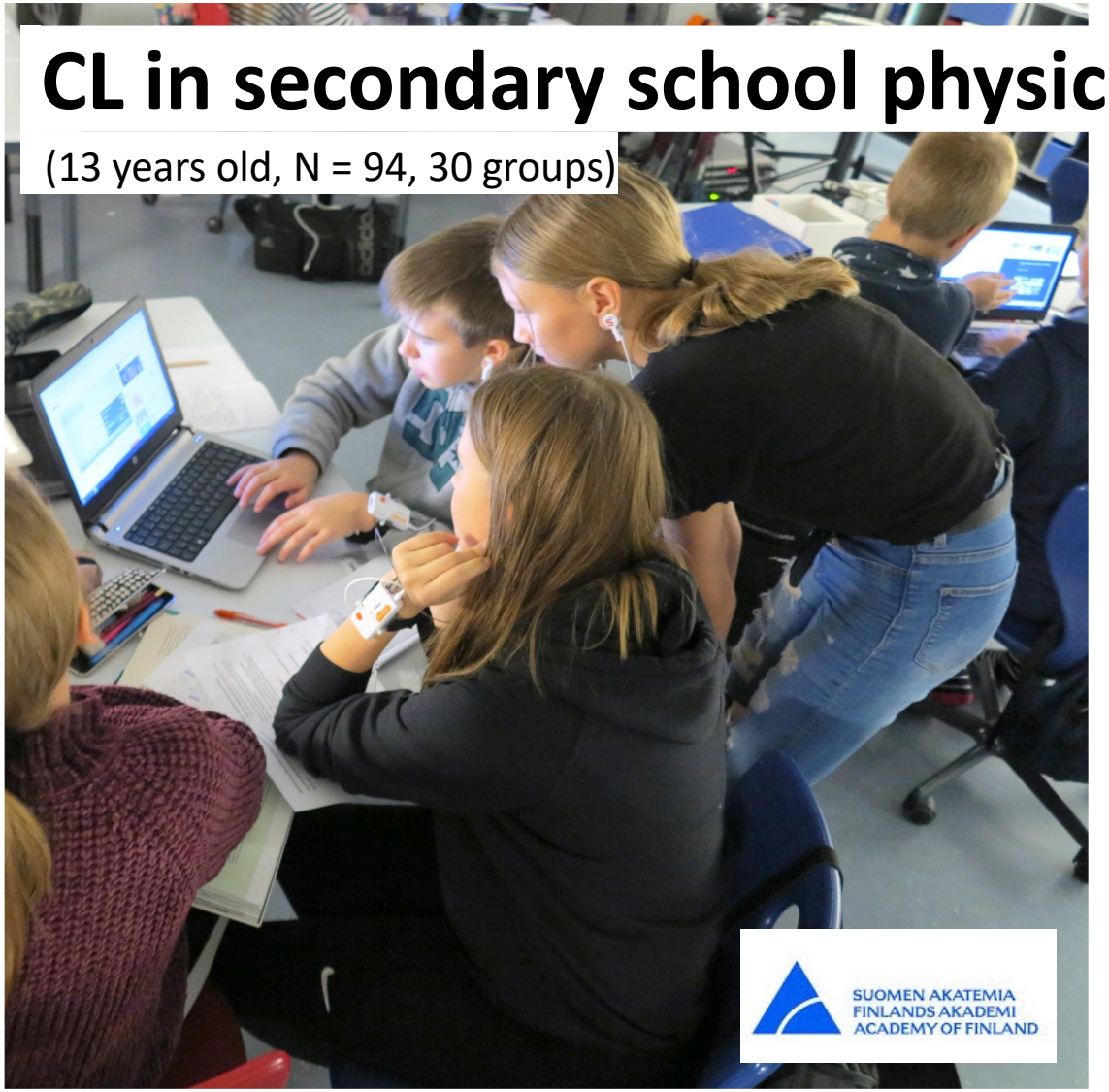
Mobile eye tracking

Multisensor devices that track student physiological activation

Logdata, situated questionnaires, evaluation forms, student products

CL in secondary school physics

(13 years old, N = 94, 30 groups)



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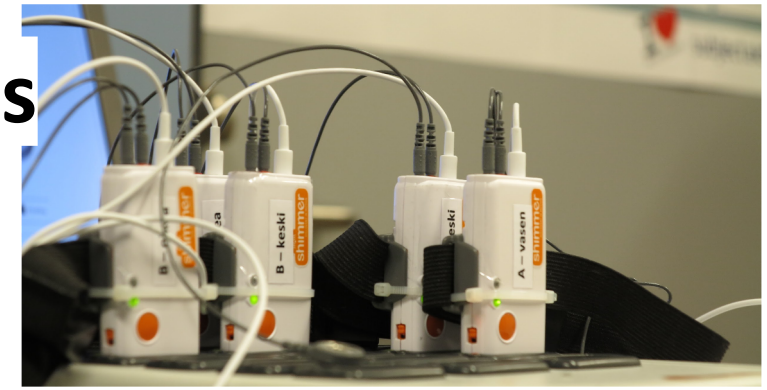
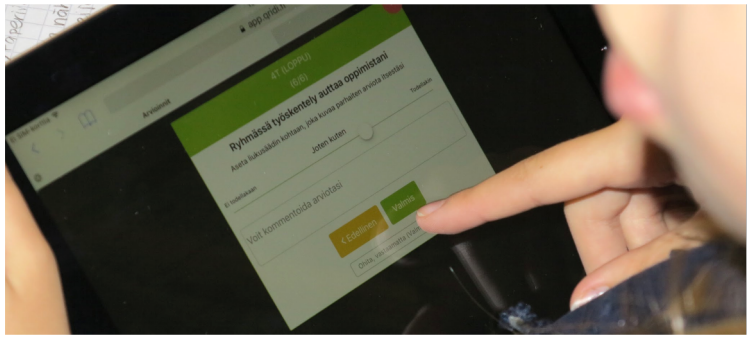
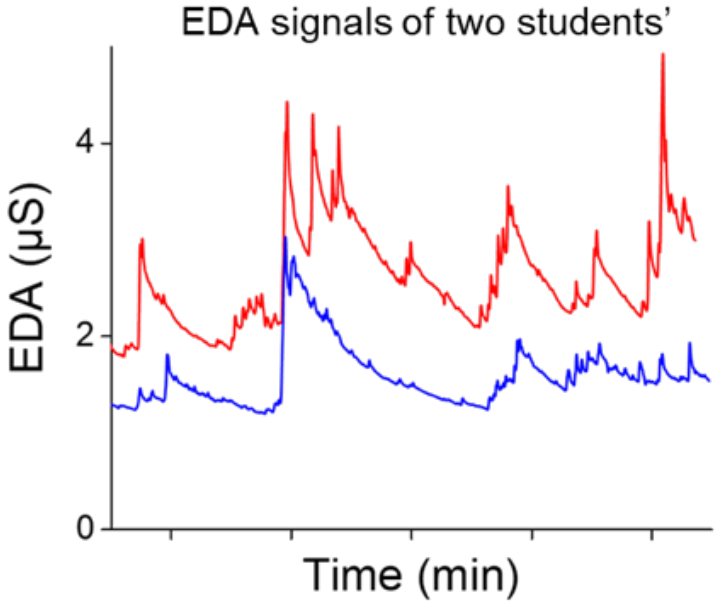




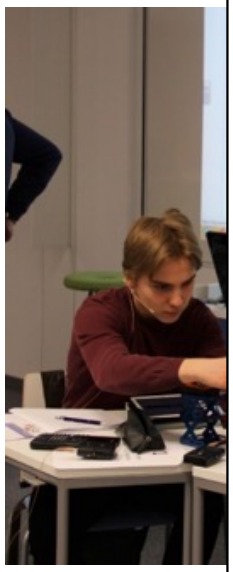
When students monitor learning together, they tend to synchronize physiologically with each other

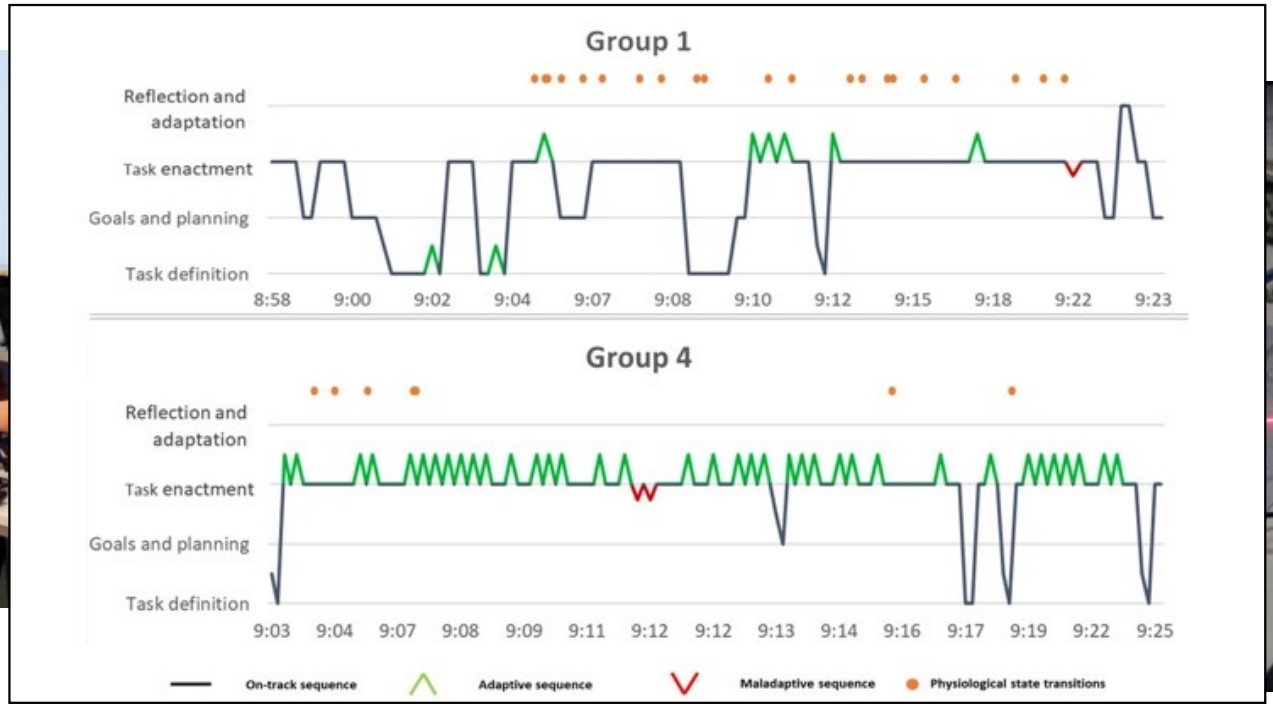


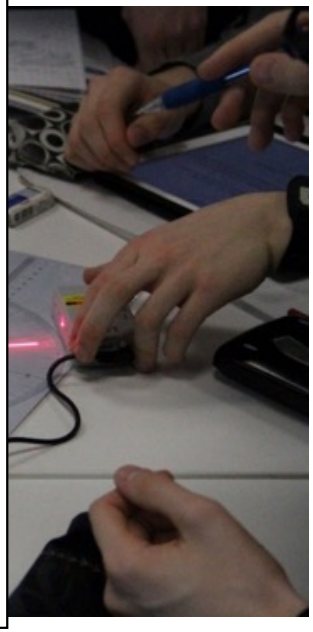
Haataja, E., Malmberg, J., & Järvelä, S. (2018). Monitoring in collaborative learning: Co-occurrence of observed behavior and physiological synchrony explored. *Computers in Human Behavior*, *87*, 337–347.

What follows socially shared monitoring?

Physiological state transitions discovered by machine learning methods are more frequent in sessions when groups are on-track and there is a low need for regulation







Sobocinski, M., Malmberg, J., Dindar, M., Järvelä, S., Isosalo, A. & Noponen, K. (2020). How does monitoring set the stage for adaptive or maladaptive behavior in collaborative learning? *Metacognition and Learning*

What do we know about SSRL?

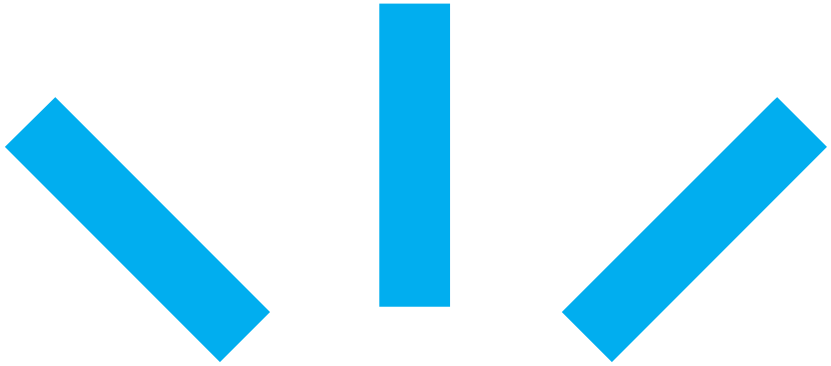
Regulation is a social phenomena (Järvenoja et al. 2015), temporal process and can be evidenced in patterns (Azevedo et al. 2016).

It is present in successful CL (Järvelä et al., 2016), but rather rare (Malmberg et al., 2017).

All regulation types play a role: CoRL reificates SRL and SSRL (Hadwin et al., 2018; Kurki et al., 2019)

Metacognitive monitoring drives groups for CL interactions (Haataja et al., 2016) for adaptation and change (Sobocinski et al., 2020).

Challenging events inviting regulation are reflected in multimodal data (Järvelä et.al., 2019).



How SSRL can be leverages to intelligent technologies?

Innovations
><
Research-based innovations

We need evidence based innovations in teaching, learning and education.

AI and adaptive systems help learners to be aware, but *we want learners to learn to be adaptive*

Theory building for developing metrics to measure SSRL

Järvelä, S., Malmberg, J., Haataja, E., Sobosincki, M., & Kirschner, P. (2021). What multimodal data can tell us about the self-regulated learning process? *Learning and Instruction*, 72

Practical su

provide learners

Online
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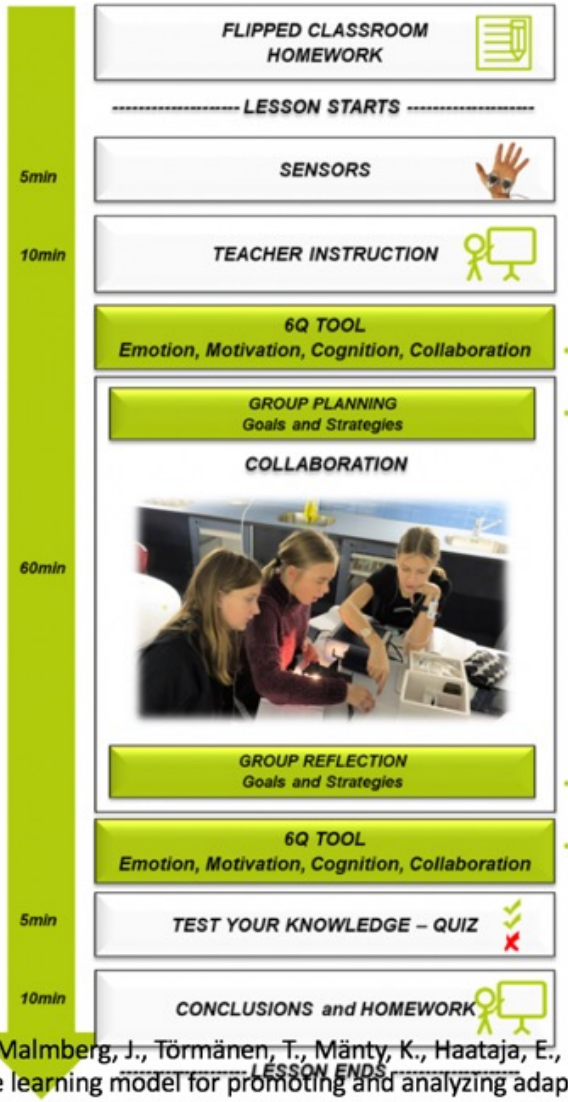

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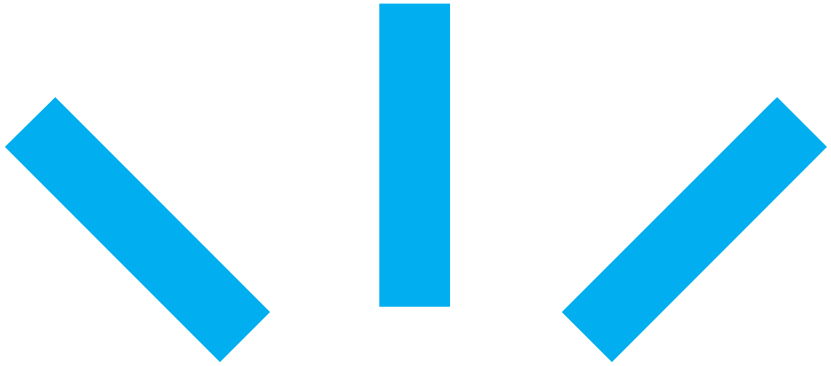

How human sciences can shape digitalization?


GenZ
STRENGTHENING
HUMAN CAPABILITIES!
Generation Z and beyond: Co-evolution of human capabilities and intelligent technologies in the 21st century
OULUN YLIOPISTO
ACADEMY OF FINLAND

~~How people react to and use new technologies ?~~

How human scientists can participate co-evolution of human capabilities and intelligent technologies

GenZ
STRENGTHENING HUMAN CAPABILITIES!

GenZ

STRENGTHENING HUMAN CAPABILITIES!

Generation Z and beyond:

The generation that has been born after the year 2000 and is familiar with technologies and the use of social media. Beyond: their children and grandchildren

Human skills and capabilities

The skills and capabilities that are natural for human beings and which technologies and machines lack.

Technological transformation

Technologies are becoming more intelligent and ubiquitous (Artificial Intelligence, Virtual / Augmented / Mixed Reality, Internet of Things, Robotics, 5G/6G.

https://www.youtube.com/watch?reload=9&v=wUvTFEFvABs

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GenZ
STRENGTHENING HUMAN CAPABILITIES!

Thank You

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