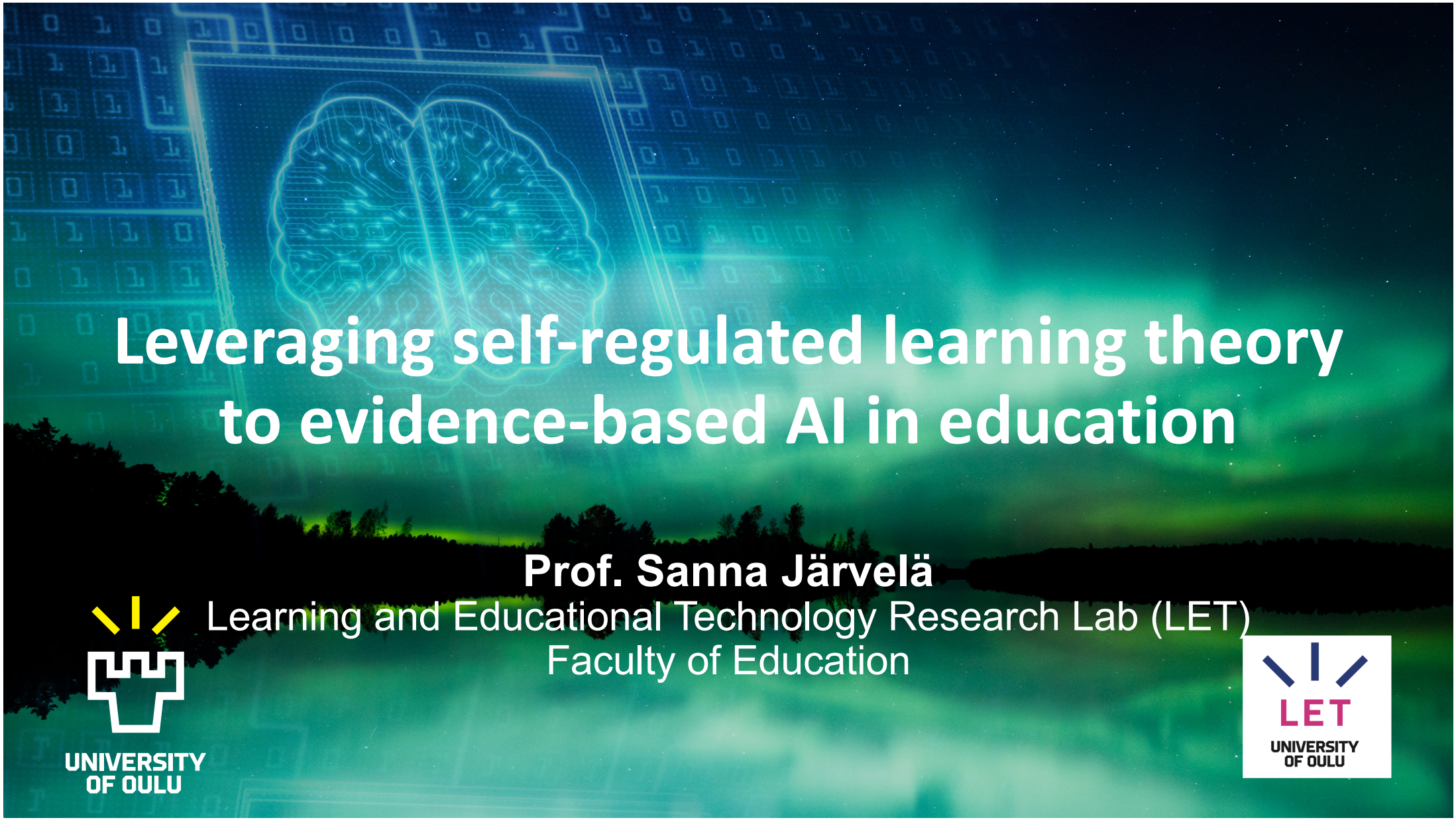
Leveraging self-regulated learning theory to evidence-based AI in education
Prof. Sanna Järvelä
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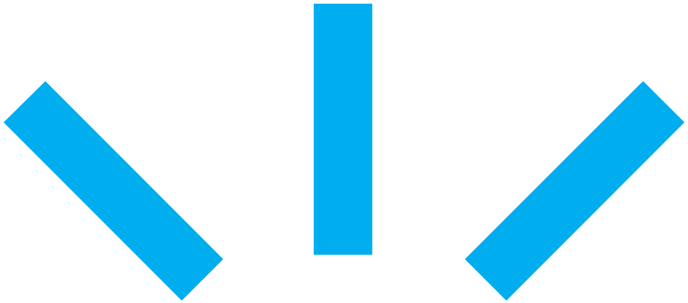


What is SRL and SSRL?
What are we doing with AI in our research?
How can AI help learners?

Learners can monitor and regulate their learning

"*experimenting with your learning*"

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

Learners transform their mental abilities into skills and competences

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.

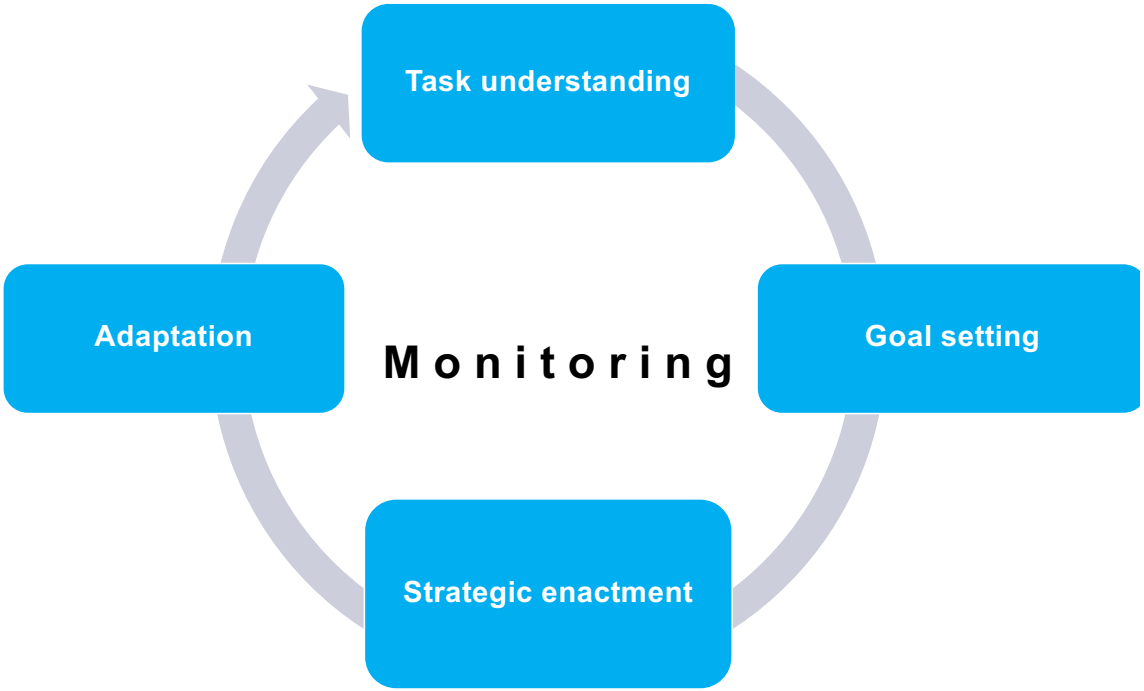
Learning is a complex process

Järvelä, S., Malmberg, J., Sobocinski, M., & Kirschner, P. (2021). Metacognition in collaborative learning. In U. Cress, A. Wise, C. Rosé, & J. Oshima (Eds.), *International handbook of computer supported collaborative learning* (pp. 281–294). Springer


What is critical for learning success in 21st century?
A new set of uniquely human skills and competencies that machines cannot match or replicate

What is self-regulated learning?

(e.g. Winne & Hadwin, 1998; Zimmerman 20(



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

SRL learners are active and proactive learners = they succeed in their learning

SRL is an adaptive process that you develop and refine over time

CoRL

SRL

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

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*

SRL process multimodal data

360-degree video capture + audio

Mobile eye tracking

Multisensor devices that track student physiological activation

Logdata, situated questionnaires, evaluation forms, student products

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

Progress in our SSRL empirical research

When, how and what makes regulation in collaborative learning functional?

Evidence SSRL
(Järvelä & Hadwin, 2014)

SRL,coRL & SSRL in CL
(Järvenoja et al.,2014)

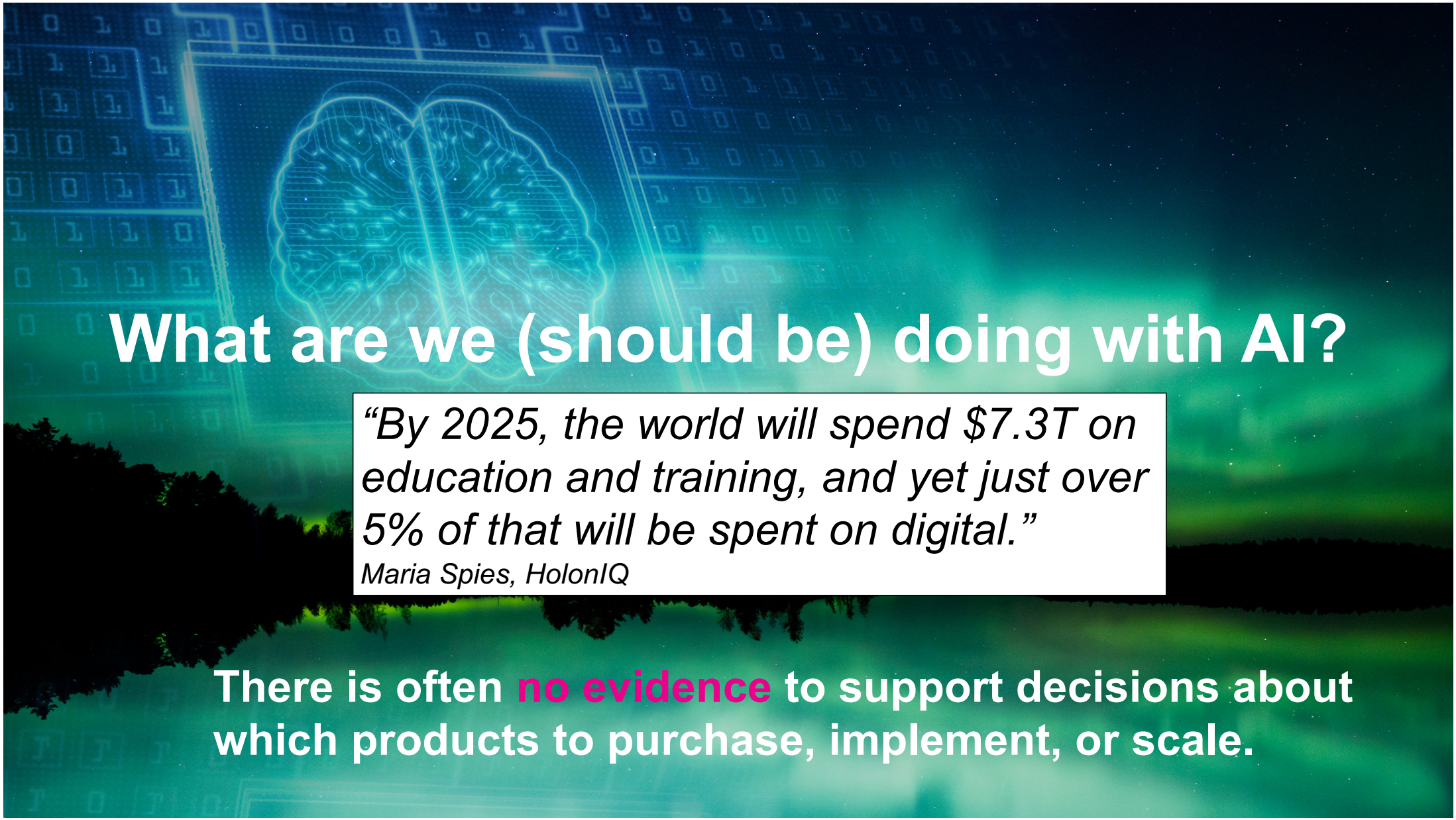
Patterns and sequences
(Malmberg, et al., 2014; Sobocinski et al, 2016)

Testing and evidencing modalities
(Haataja et al., 2020; Järvelä et al., 2021; Törmänen et al., 2020)

Understanding "sharing"
(Pijeira-Diaz et al., 2018; Dindar et al., 2021)

Modelling and predicting SSRL
(Nguyen et al., 2021; 2022 Vuorenmaa et al., 2022)

cf. Azevedo & Gasevic, 2019; Bakhtiar et al., 2018; Hadwin et al., Fan et al., 2022; Lajoie et al., 2020; Lobczowski, 2021; Molenaar et al. 2022; Sonnenberg & Bannert, 2019


What are we (should be) doing with AI?
“By 2025, the world will spend $7.3T on education and training, and yet just over 5% of that will be spent on digital.”
Maria Spies, HolonIQ
There is often no evidence to support decisions about which products to purchase, implement, or scale.

“Machines will be capable in 20 years to do all what humans can do.”

Herbert Simon, 1952

Tools and technologies have always augmented humans.
Now it is data.

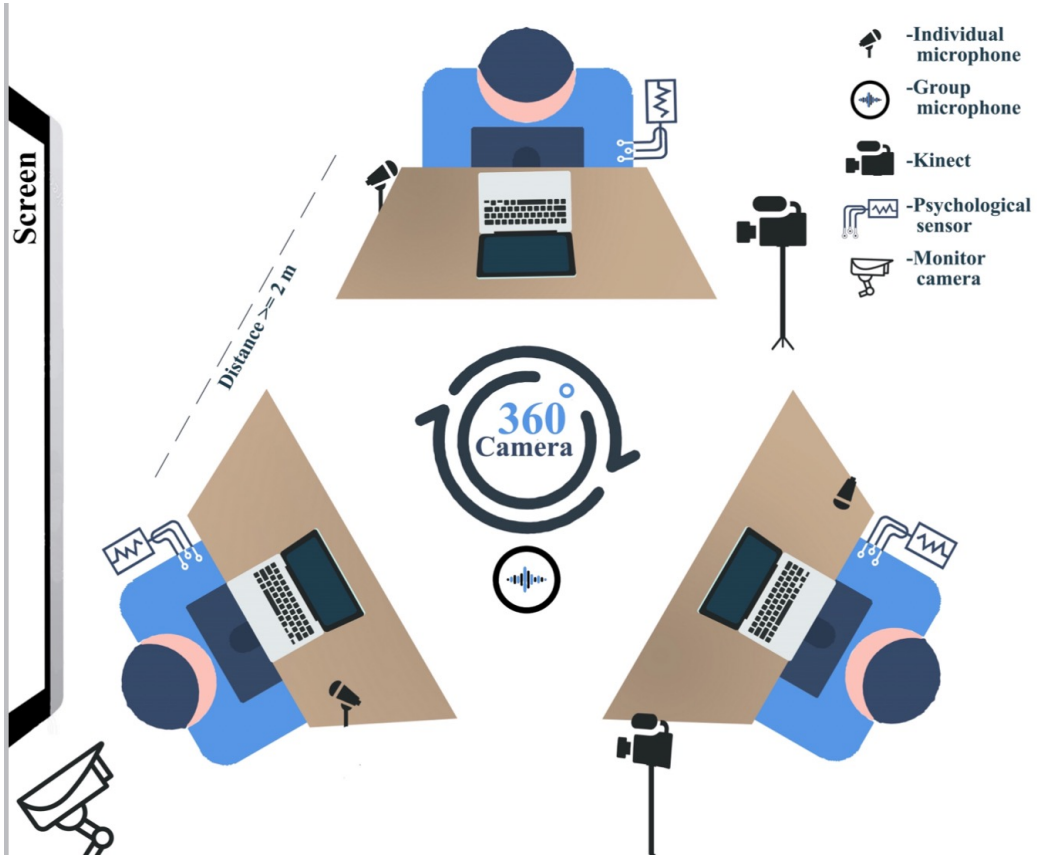
The data are useful in education, only when it is analysed throught the learning scientist lenses.

What are we doing @ LET UNIVERSITY OF OULU

1. Use data to understand SSRL
2. Use AI to make data meaningful for us
3. Help learners and AI to collaborate
4. Augment learners to be more adaptive self-regulated learners

Translate AI to SSRL for evidence based educational technology

Collaborative learning multimodal data



Li, Y., Liu, Y., Nguyen, A., Shi, H., Vuorenmaa, E., Järvelä, S., & Zhao, G. (2022). *Exploring interactions of regulation in collaborative learning: A multimodal dataset*. In International Conference on Multimodal Interaction (ICMI).

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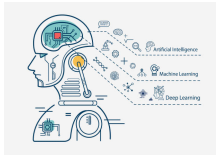
AI augmenting socially shared regulation in collaborative learning



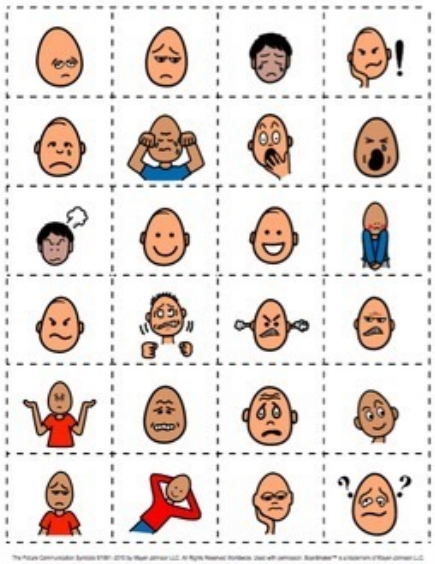
Multimodal Deep Learning

Speech Audio

Video

Physiological Signals

Visual Cues



Collaborative learning success

Nguyen, A., Järvelä, S., Wang, Y., & Róse, C. (2022). Exploring Socially Shared Regulation with an AI Deep Learning Approach Using Multimodal Data. In *Proceedings of International Conferences of Learning Sciences (ICLS).*

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How can AI help learners?

Practical su

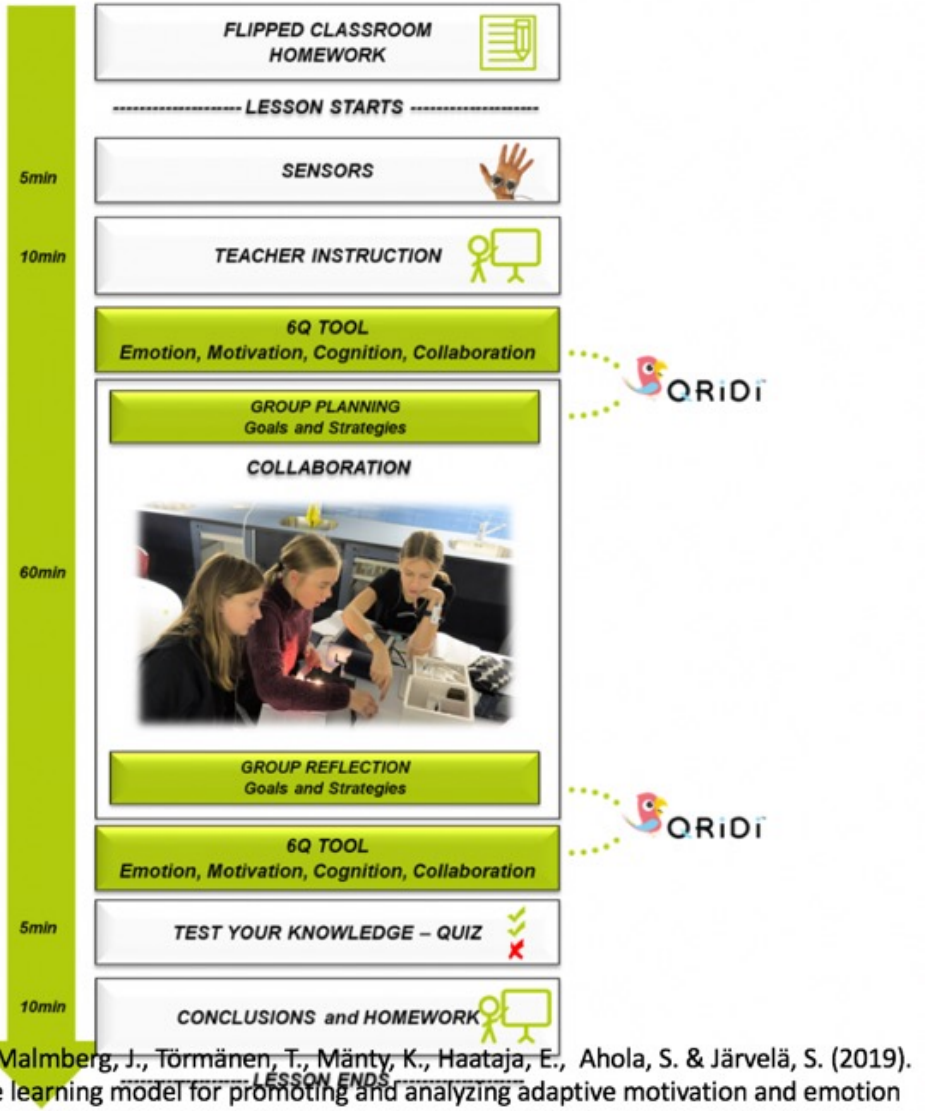
provide learners

Online
& retros

S-

Järvelä, S. , Kirschne
Understanding and p
Learning 11(3), 263-

Järvelä, S., Kirschner, P. A., Panadero, E., Mal
Socially Shared Regulation in Collaborative Lea
and Development, 63, 1, 125-142.



Järvenoja, H., Malmberg, J., Törmänen, T., Mänty, K., Haataja, E., Ahola, S. & Järvelä, S. (2019). A collaborative learning model for promoting and analyzing adaptive motivation and emotion regulation science classroom.

Data in teaching, learning and education

A fact: Learning is contextualized in the lived experiences.

Who or what does the modelling – learner of a system?

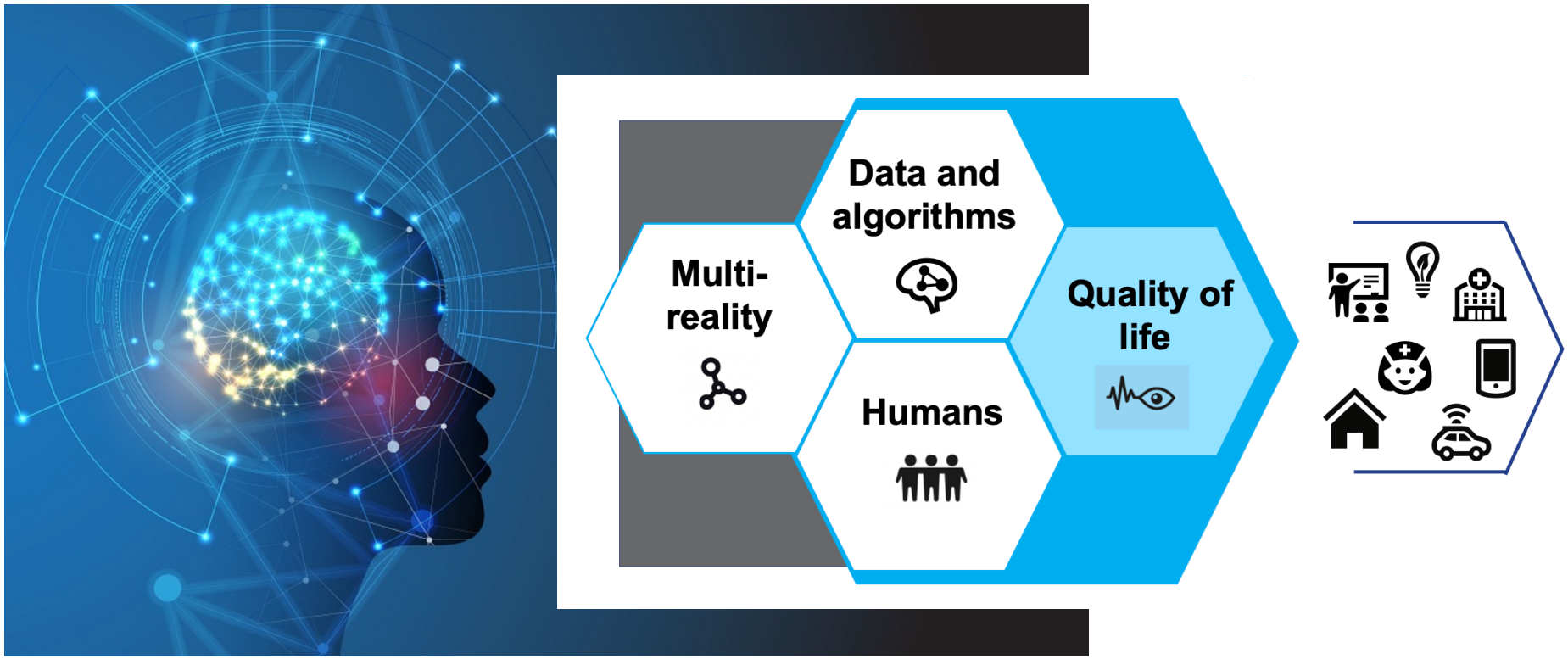
Can we create AI agent to collaborate with learners, feel and meta-reason?


Conclusions


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

HYBRID INTELLIGENCE

Human-AI co-evolution and learning in multi-realities



AI and Human reinforce each other in ethical, responsible and productive ways

cella

Centre for Learning and Living with AI

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Radboud Universiteit

TUM Educational Media Lab
TUM School of Education
Technical University of Munich

MONASH University

UNIVERSITY OF CENTRAL FLORIDA 1963

To equip especially younger learners to learn, live, and work in the age of AI

JACOBS FOUNDATION

Our Promise to Youth

CELLA aims

Design and implement AI-driven systems for supporting learners to improve their self-regulated learning skills

Develop and test practices and design principles that boost agency of learners while working with AI

To equip K-12 learners to learn, live, and work in the age of AI

Inform policy making about the application of AI in education and practices that effectively promote successful academic and workforce development

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

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


GenZ
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