




# Responsible Data-Driven Pedagogical Transformation of Higher Education

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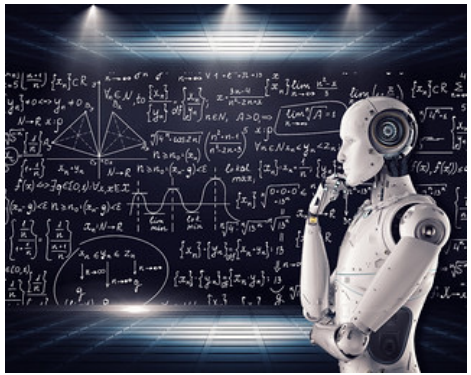
**WP 4: PEDAGOGICAL DEVELOPMENT, LEARNING ANALYTICS & AI**

# Outline

- Learning Analytics in Practice
- Learning Analytics & GenAI in Higher Education: Examples
- Responsible Pedagogical Transformation
- Discussion



# Learning Analytics in Practice

# What is Learning Analytics (LA)?

"Learning analytics refers to the measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of **understanding** and **optimizing [/supporting] learning** and **the environments in which it occurs**"

Long & Siemens, 2011

**NB! The idea of closing the loop!**

**Long, P., & Siemens, G. (2011). Penetrating the fog: Analytics in learning and education. *Educause Review, 46*(5), 31-40.**

# Problems?

- Concerns with practice of the LA field, especially at scale!

- **Core vision**: “technical, pedagogical and social domains must be brought into dialogue with each other to ensure that interventions and organizational systems serve the needs of all stakeholders.”

# STILL NOT!

- LA have been implemented and used in various countries in different ways, often at a limited scale (Viberg et al., 2018).

- Motz et al. (2023): 71%  of 246 articles do not include any measure of student learning, and 89 % do not attempt to intervene in the examined learning setting to improve student learning, student support, or teaching support.

**Motz, B. A., Bergner, Y., Brooks, C. A., Gladden, A., Gray, G., Lang, C., Li, W., Marmolejo-Ramos, F., & Quick, J. D. (2023). A LAK of Direction: Misalignment Between the Goals of Learning Analytics and its Research Scholarship.** ***Journal of Learning Analytics****,* ***10****(2), 1-13.* https://doi.org/10.18608/jla.2023.7913

**Viberg, O., Hatakka, M., Bälter, O., & Mavroudi, A., Bälter, O., & Mavroudi, A. (2018). The current landscape of learning analytics in higher education.** ***Computers in Human Behavior****.* https://doi.org/10.1016/j.chb.2018.07.027.

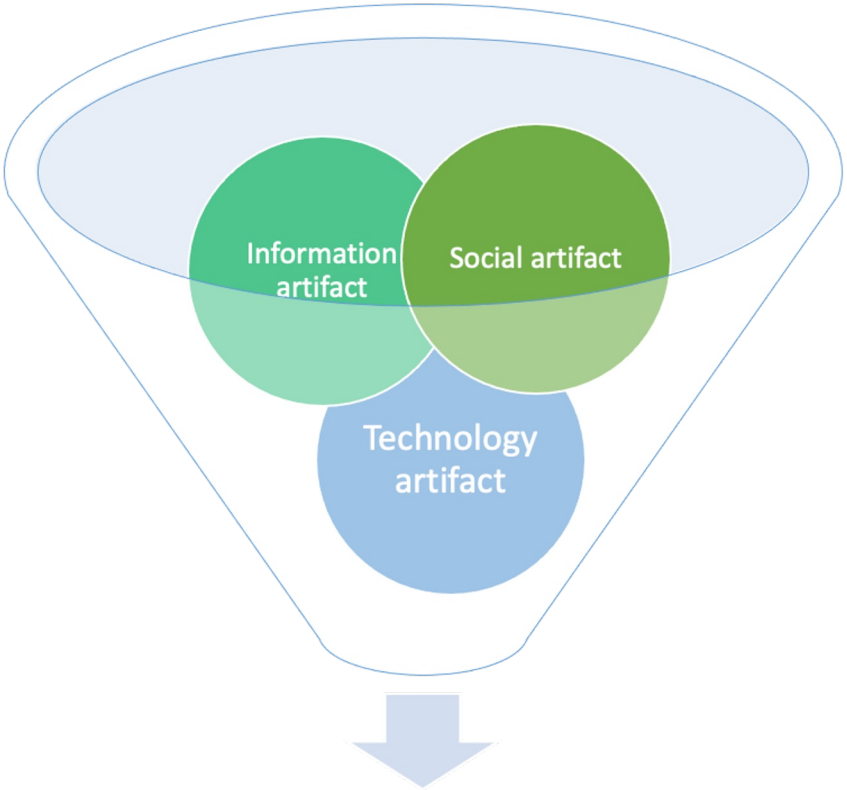
# Practicable LA?

*Practicable:* “able to be done”; “put into action”; practised “successfully” (Cambridge Dictionary 2022; Oxford Learner’s Dictionary, 2022).

- **What** exactly is that ‘something’ in learning analytics?
- **Who** is going to put it into practice?
- **What** practices are learning analytics aiming to improve?
- **How** can we distinguish between what is more or less practicable?

“**Education practices is a systemic perspective**!”

**Viberg, O., & Grönlund, Å. (2023). *Practicable Learning Analytics*. Springer.**



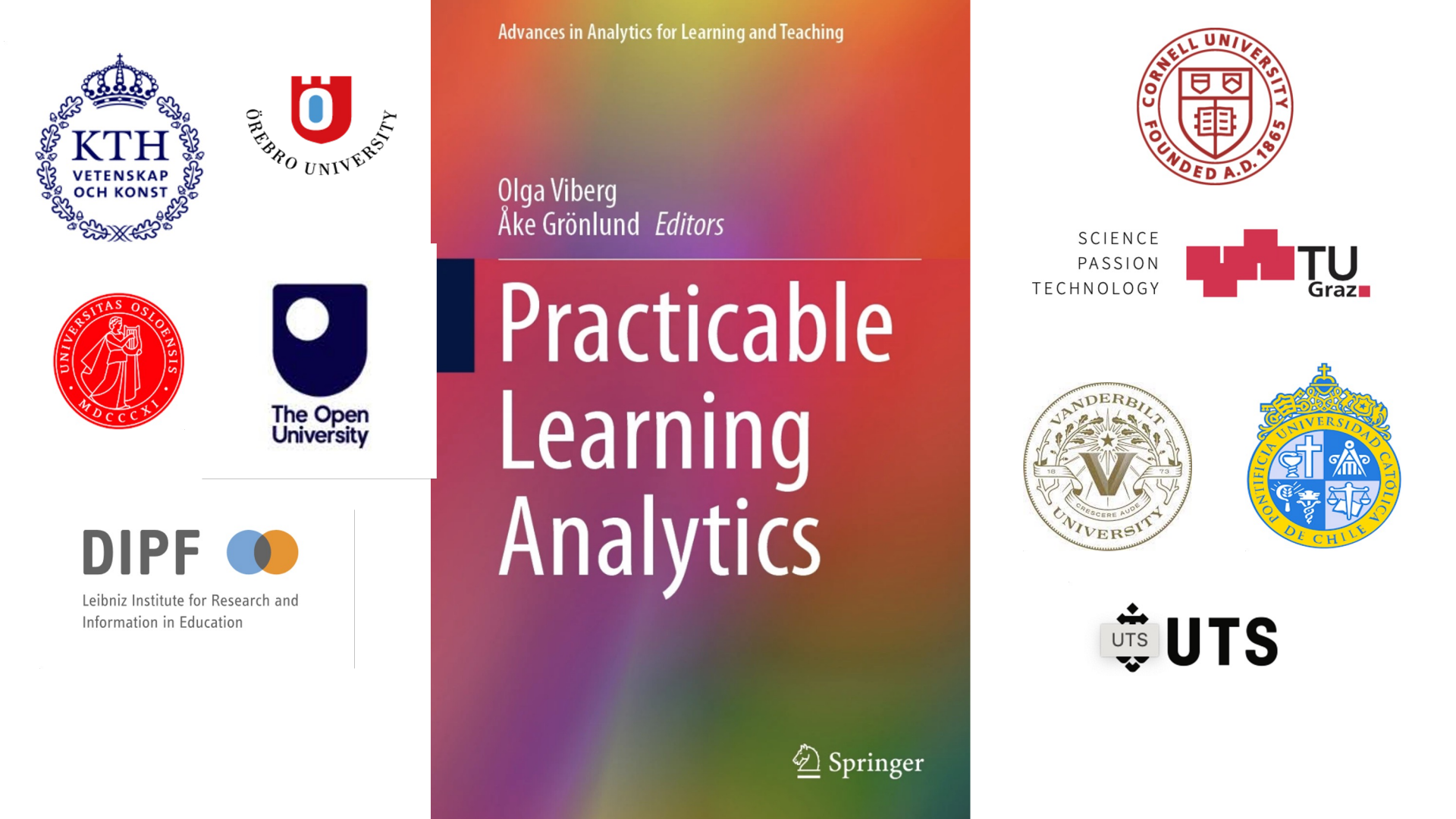

# Information System Artifact

Lee, A., Thomas, M., & Baskerville, R. (2015). Going back basic in design science: From the information technology artifact to information systems artifact. *Information Systems artifact, 25, 5-21.*

**To make a LA (AI) system '*practicable*' means understanding how it enhances the information system artifact as a whole in the targeted educational setting.**

The information system artifact should be understood as
**an object to be designed.**

# "What is not practicable is not likely to be used!"


Advances in Analytics for Learning and Teaching
Olga Viberg
Åke Grönlund Editors
Practicable Learning Analytics
Springer
KTH VETENSKAP OCH KONST
ÖREBRO UNIVERSITY
CORNELL UNIVERSITY FOUNDED A.D. 1865
SCIENCE PASSION TECHNOLOGY
TU Graz
UNIVERSITAS OSLOENSIS MDCCCXI
The Open University
VANDERBILT UNIVERSITY
PONTIFICIA UNIVERSIDAD CATOLICA DE CHILE
DIPF
Leibniz Institute for Research and Information in Education
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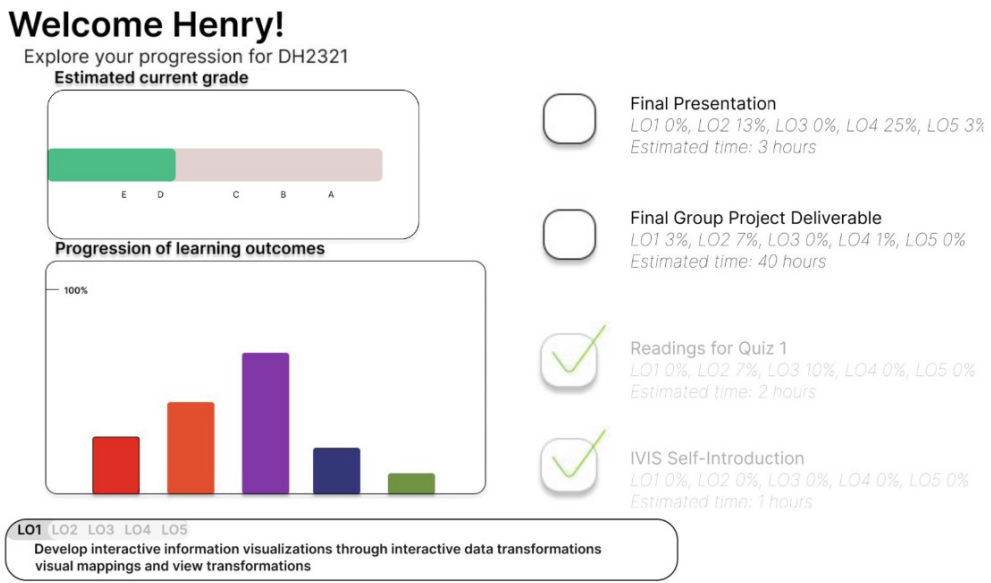
# Learning Analytics & GenAI Examples

# Examples/Students in Focus



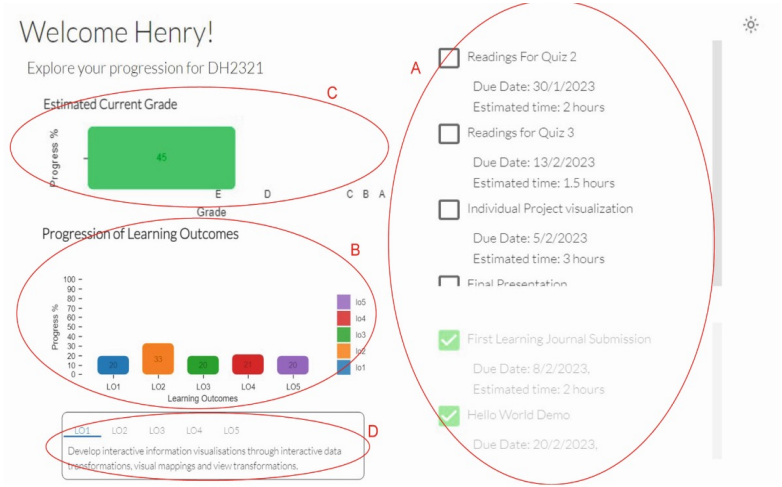




**Fig. 2.** The four components. A: *assignment handler*; B: *learning outcome tracker*; C: *grade progression chart*; and D: *learning outcome description box.*


Buvari, S., Viberg, O., Iop, A., Romero, M. (2023). A Student-Centered Learning Analytics Dashboard Towards Course Goal Achievement in STEM Education. https://doi.org/10.1007/978-3-031-42682-7_64

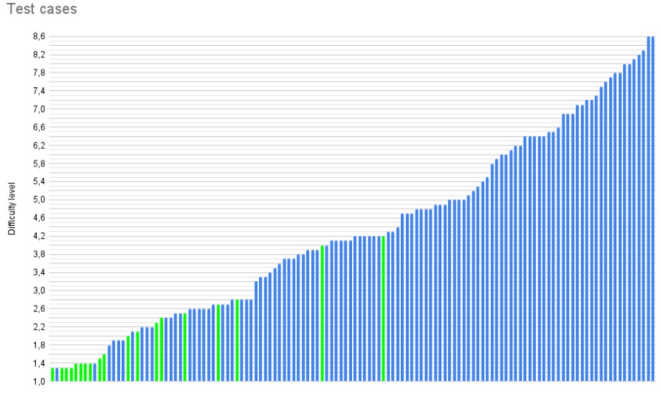
# Kattis vs ChatGPT: Assessment & Evaluation of Programming Tasks in the Age of Artificial Intelligence

***RQ:*** To what extent is ChatGPT able to solve automatically generated coding tasks in the setting of introductory programming education?



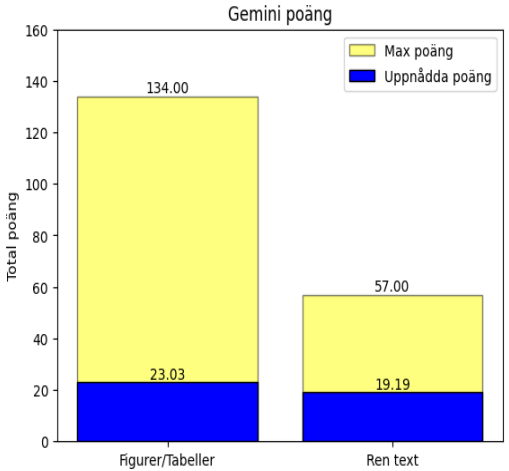
**Table 2: Overview of the type of errors and difficulty level of partially accepted solutions**

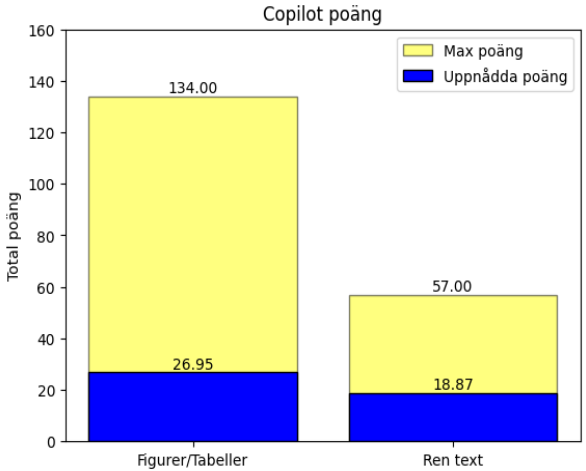
| Ratio of approved inputs | % of approval | Kattis' assessment | Difficulty level |
|---|---|---|---|
| 1/13 | 8% | WA | 1.9 |
| 3/12 | 25% | TLE | 2.2 |
| 1/33 | 3% | WA | 2.4 |
| 1/38 | 3% | WA | 2.5 |
| 5/23 | 22% | WA | 2.6 |
| 1/13 | 8% | WA | 2.6 |
| 1/78 | 1% | WA | 2.7 |
| 5/28 | 18% | WA | 2.6 |
| 3/5 | 60% | TLE | 2.8 |
| 1/34 | 3% | TLE | 3.2 |
| 3/11 | 27% | WA | 3.3 |
| 2/13 | 15% | WA | 3.5 |
| 12/21 | 57% | WA | 3.9 |
| 12/40 | 30% | WA | 4.1 |
| 1/2 | 50% | RTE | 4.8 |
| 2/52 | 4% | WA | 5.0 |
| 5/18 | 28% | TLE | 6.2 |
| 2/17 | 12% | TLE | 6.4 |
| 1/13 | 8% | WA | 6.5 |

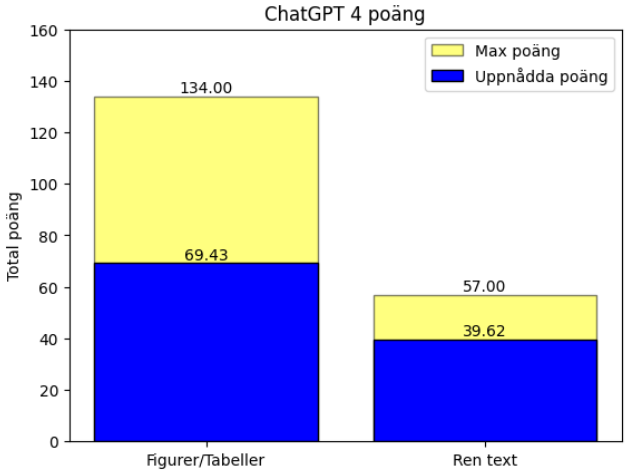



Dunder, N., Lundborg, S., Wong, J., and Viberg, O.. 2024. Kattis vs ChatGPT: Assessment and Evaluation of Programming Tasks in the Age of Artificial Intelligence. In *The 14th Learning Analytics and Knowledge Conference (LAK '24), March 18–22, 2024, Kyoto, Japan.* ACM, New York, NY, USA, 11 pages. https://doi.org/10.1145/3636555.3636882

# & Examination: *Work-in-Progress*




**N** = 191 examination questions from 13 different exams (quiz-based examination)

- **ChatGPT4's capacity is the highest!**
- All the models have problems to solve tasks with graphics.

**Lindström Bjärklint, J., Herzen-Hansson, P. & Viberg, O. *work-in-progress***

# Hello GPT! Goodbye home examination?

**Teachers tended to be more critical towards students-written texts**

***Downgraded**, **failed** and rarely awarded a high grade - seemed to set **higher standards** for a passing grade*

- repetitive statements
- incoherency
- lack of citations and references
- literature not listed in the course readings
- structural and aesthetical flaws

***Suspected AI chatbot activity***

- ”too good to be written by a student”
- ”made-up” references
- ”non-human sense”

Farazouli, A., Cerratto-Pargman, T., Bolander-Laksov, K., & McGrath, C. (2023). Hello GPT! Goodbye home examination? An exploratory study of AI chatbots impact on university teachers’ assessment practices. *Assessment & Evaluation in Higher Education*, 1-13.

Cerratto Pargman, T. C., Sporrong, E., Farazouli, A., & McGrath, C. (2024). Beyond the Hype: Towards a Critical Debate About AI Chatbots in Swedish Higher Education. *Högre utbildning*, *14*(1), 74-81.

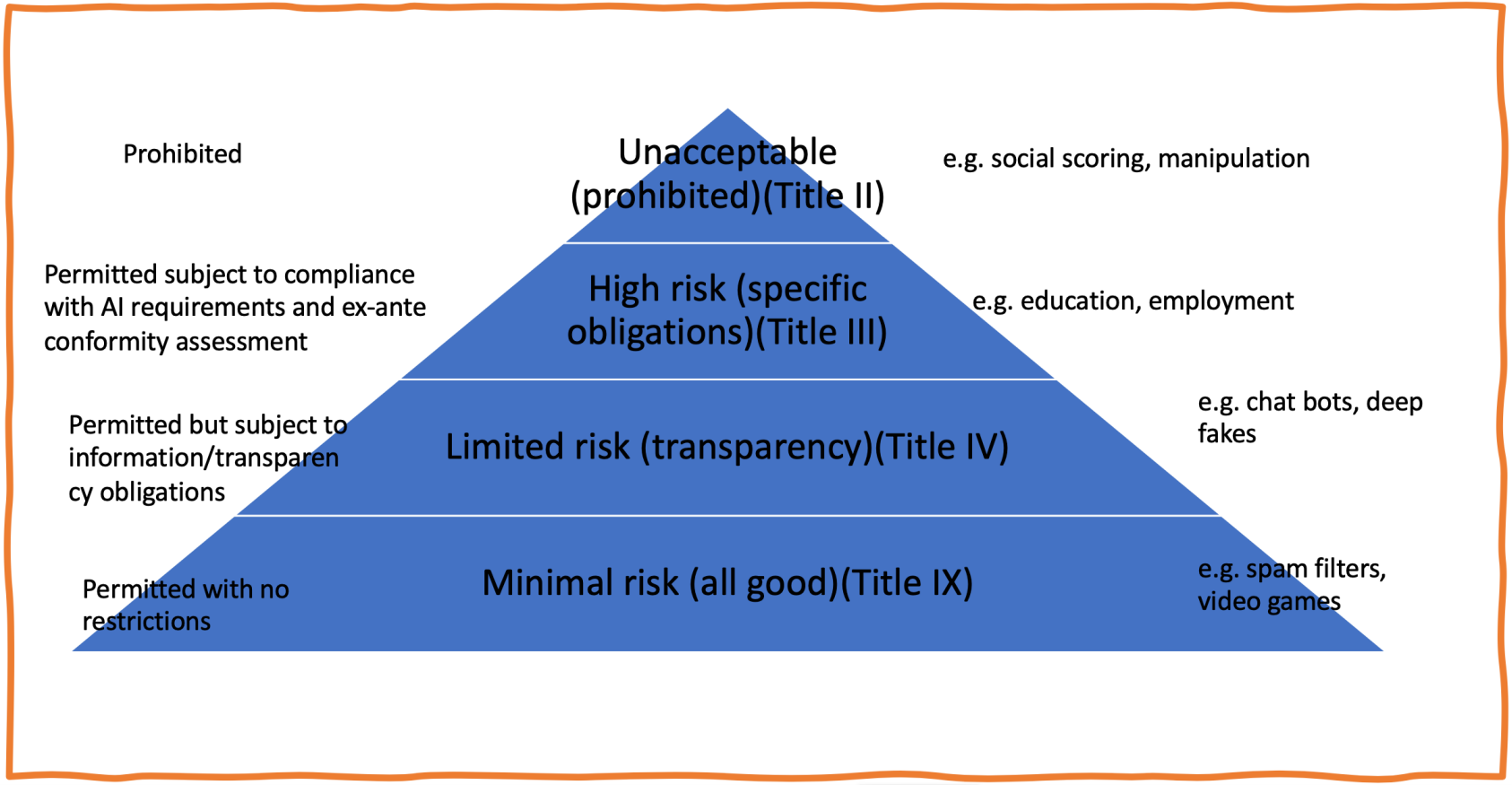
# Automated grading systems – in programming assignments

- helping manage teachers' workload while saving time.
- contributing to fairer assessments compared to manual grading, as AGSs apply grading criteria consistently and impartially.

- risks that students focused too much on getting their code to simply compile and run instead of grasping core programming concepts.


**Figueras, C. Farazouli, A, McGrath, C, Rossitto, C. and Cerratto Pargman, T. (under review) Promises and Breakages of Automated Grading Systems: Insights from Practitioners.**

# **Responsible** Pedagogical Transformation


Prohibited
Unacceptable (prohibited)(Title II)
e.g. social scoring, manipulation
Permitted subject to compliance with AI requirements and ex-ante conformity assessment
High risk (specific obligations)(Title III)
e.g. education, employment
Permitted but subject to information/transparency obligations
Limited risk (transparency)(Title IV)
e.g. chat bots, deep fakes
Permitted with no restrictions
Minimal risk (all good)(Title IX)
e.g. spam filters, video games

# Two strands of attention regarding AI ethics in higher education

- The predominant strand focuses on procedural elements of **data management**.
  - The ethics of data and the algorithms

- The other strand focuses on **education as a moral practice**.
  - It seeks an understanding of where should (and should not) AI be deployed and why.

**Cerratto Pargman, T., McGrath, C., Viberg, O., & Knight, S. (2023). New Vistas on Responsible Learning Analytics: A Data Feminist Perspective. *Journal of Learning Analytics*, 1-16**

## What would make university teachers willing to integrate AI into their teaching?


- Across all three cases, a majority of respondents indicated that **universities had a responsibility** to provide students with AI tools and services to optimize student learning..

- However in Case A (first-generation student) and Case C (student with a learning disability), the respondents indicated that **universities should use** AIED tools and systems to a higher degree **to achieve equitable outcomes**.

- Supporting the assertion that **universities have an obligation to act on** considerations of **equity** and **fairness** (Prinsloo & Slade, 2017).

**McGrath, C., Cerratto Pargman, T.., Juth, N., & Palmgren, P. J. (2023). University teachers' perceptions of responsibility and artificial intelligence in higher education-An experimental philosophical study. *Computers and Education: Artificial Intelligence*, 100139.**

# What Explains Teachers' Trust of AI in Education across Six Countries?

**N = 508**

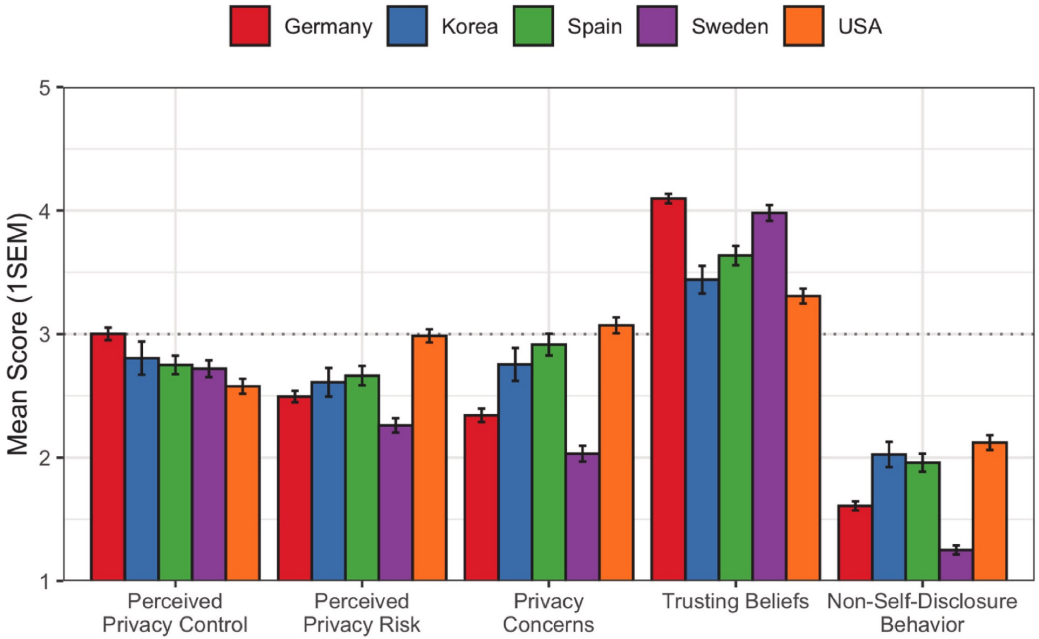
- their demographic and professional characteristics
- AI understanding and self-efficacy
- cultural values
- geographic location

**1.** Teachers with higher AI understanding and self-efficacy perceive more benefits, fewer concerns, & stronger trust.
**2.** Geographic and cultural differences in teachers' attitudes, including their trust in AI-EdTech, but no demographic differences emerged based on their age, gender, or level of education.
**3.** Efforts to raise teachers' understanding of, and trust in AI-EdTech, while considering their cultural values are encouraged to support its adoption in K-12 education.

**Viberg**, O., Cukurova, M., Feldman-Maggor, Y. …Kizilcec, R. (*under review*). What Explains Teachers' Trust of AI in Education across Six Countries? Pre-print: https://arxiv.org/abs/2312.01627

# What are students' privacy concerns in LA?

NB! Students are not too concerned!




**Viberg**, O., Kizilcec, R., Jivet, O., Martinez-Mones, A., Oh, A., Mutimukwe, C., Hrastinski, S. & Scheffel, M. (2024). Cultural differences in students' privacy concerns in learning analytics across Germany, South Korea, Spain, Sweden, and the United States. *Computers in Human Behaviors Reports.* https://doi.org/10.1016/j.chbr.2024.100416

# Discussion

- What AI tools, if any, do you currently use in your practice?
- What kind of support/competence development do you need to use AI tools (e.g., AI chatbots like ChatGPT) effectively and responsibly?
- What are the opportunities and challenges of using Generative AI in higher education?