



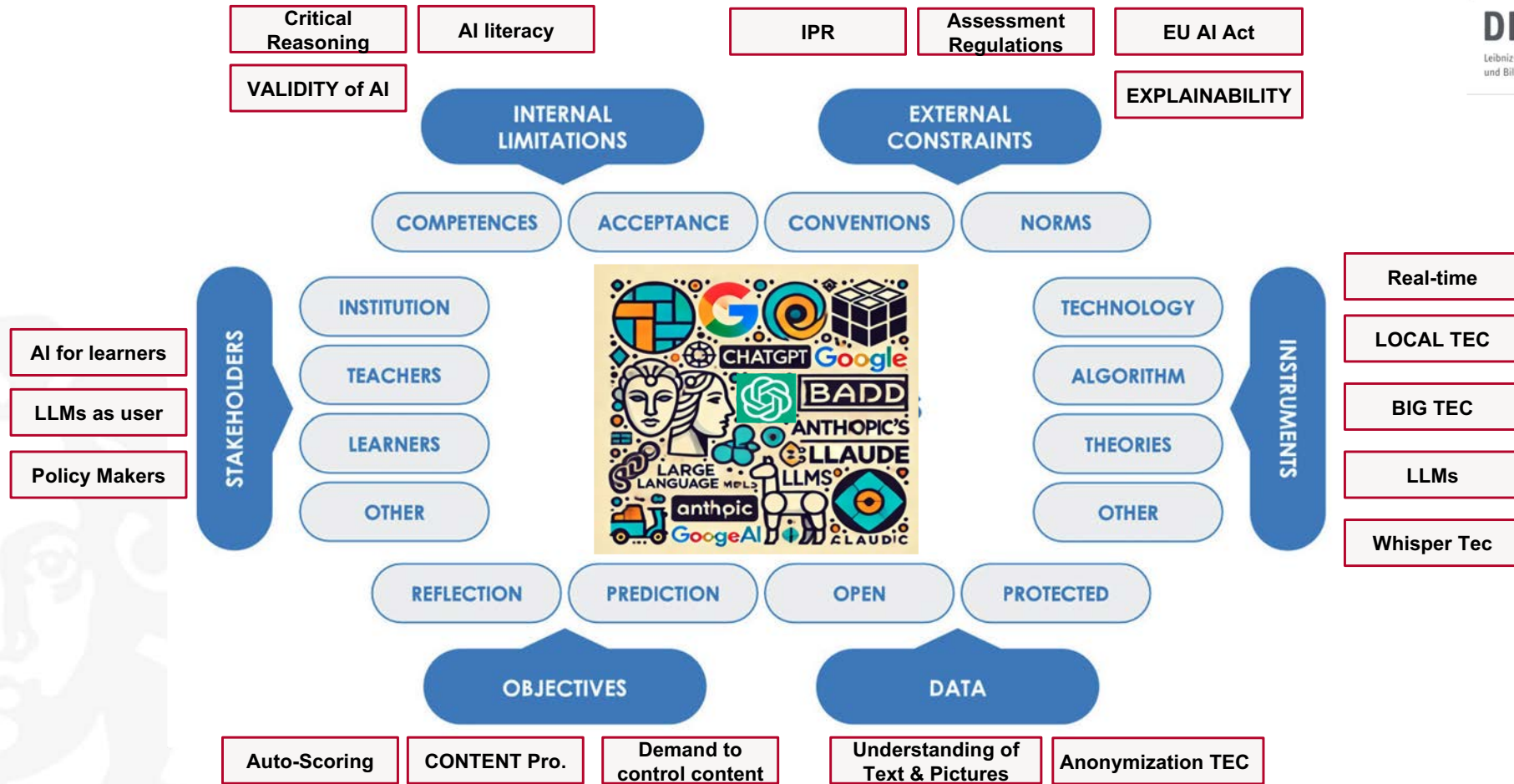
Design, Development and Evaluation of
Highly Informative Learning Analytics
... in secondary education.

Outline

1. Learning Analytics in the Age of AI
2. Highly Informative Learning Analytics (HILA)
3. The Role of Learning Design
4. Data-enriched Learning Analytics (DeLA)
5. Design-based Research (DBR)
6. Empirical findings
7. Take away messages

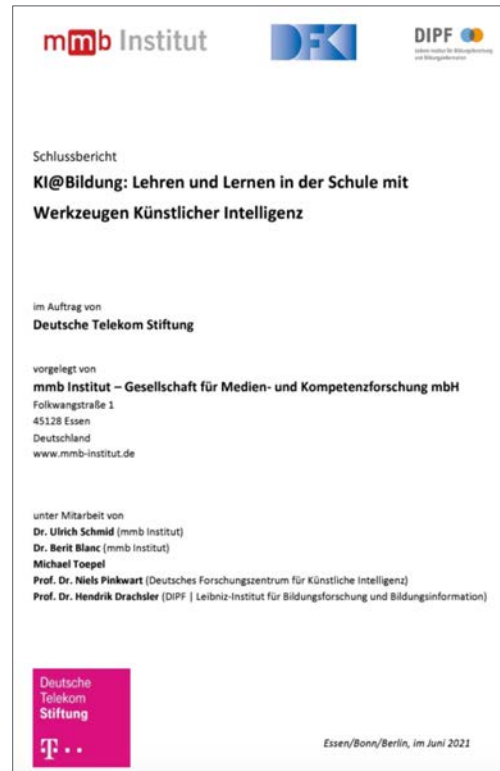


Learning Analytics in the Age of AI



Greller, W. & Drachslar, H. (2012). Turning Learning into Numbers. **Toward a Generic Framework for Learning Analytics.** Journal of Educational Technology & Society, 15(3), 42–57.

Did AI or Learning Analytics change education?



State of Research:

1. Empirical evidence on improved learning with LA is still insufficient.
2. So far, LA systems have been evaluated only to a minimal extent from a learning-theoretical perspective.
3. There is a need for research regarding the transferability of LA systems between educational systems.

Holmes, W., Anastopoulou S., Schaumburg, H. & Mavrikis, M. (2018). **Personalisiertes Lernen mit digitalen Medien. Ein roter Faden.** Stuttgart: Robert Bosch Stiftung.

Schmid, U., Blanc, B., Toepel, M., Pinkwart, N., & Drachler, H. (2021). **KI@ Bildung: Lehren und Lernen in der Schule mit Werkzeugen Künstlicher Intelligenz.** mmb Institut GmbH.

Challenges for the rollout of Learning Analytics

studiumdigitale

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DIPF
Leibniz-Institut für Bildungsforschung
und Bildungsinformation



Contents lists available at ScienceDirect

Computers & Education

journal homepage: www.elsevier.com/locate/compedu



Learning analytics in European higher education—Trends and barriers[☆]

Yi-Shan Tsai^{a,*}, Diego Rates^b, Pedro Manuel Moreno-Marcos^c,
Pedro J. Muñoz-Merino^c, Ioana Jivet^d, Maren Scheffel^d, Hendrik Drachsler^{e,d,1},
Carlos Delgado Kloos^c, Dragan Gašević^{a,2}



The 14th International
Learning Analytics and Knowledge
Conference

March 18 - 22, 2024

Learning Analytics in the Age of AI

- + IPR + Assessment regulations
- + Reliability + Hallucination
- + Computational power for Local LLMs
- + Privacy & dependance on Big Tec

Challenge 1: Ethics and Privacy.

Challenge 2: Weak pedagogical grounding.

Challenge 3: Resource demand.

Challenge 4: Engagement and buy-in.

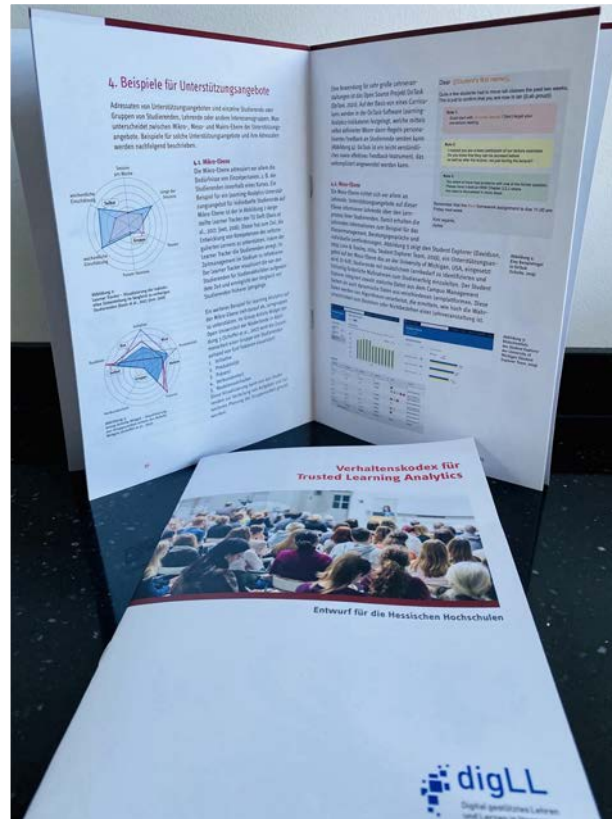
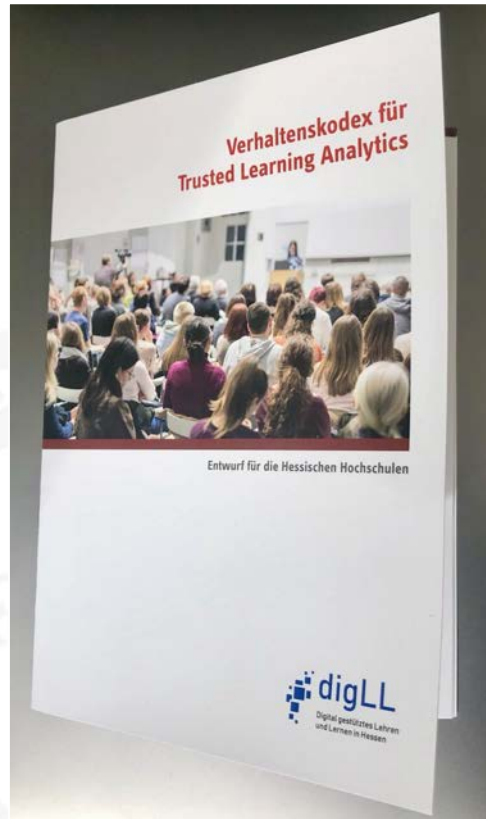
Tsai, Y-S, Rates, D., Moreno-Marcos, M. P., Muñoz-Merino, P. J., Jivet, I., Scheffel, M., Drachsler H., Delgado Kloos, C, Gašević, D (2020). *Learning analytics in European higher education-trends and barriers*, Computers & Education, 103933, <https://doi.org/10.1016/j.compedu.2020.103933>.

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Challenge 1: Ethics and privacy



7 Principles

1. Improving conditions for learning and teaching
2. Support services for all students
3. Transparent handling of data
4. Critical handling of data
5. Human control
6. Managerial responsibility
7. Commitment to continuing training

Hansen, J., Rensing, C., Hermann, O., & Drachler, H. (2020). **Verhaltenskodex für Trusted Learning Analytics: Entwurf für die Hessischen Hochschulen**. Frankfurt am Main, Germany. https://bit.ly/German_CoC_LA

Challenge 1: Ethics and privacy

ZfW Zentrum für
Wissenschafts-
didaktik

KI-
EDU.
NRW

DRBG
Datenrecht Beratungsgesellschaft

DATENSCHUTZRECHTLICHE BEURTEILUNG VON LEARNING ANALYTICS AN HOCHSCHULEN IN NRW

Studie im Auftrag der Ruhr-Universität Bochum

Priv.-Doz. Dr. Christian L. Geminn, Mag. iur.
Rechtsanwalt Paul C. Johannes, LL.M.
Dr. Maxi Nebel
Dr. Tamer Bile, LL.M.

März 2023


European
Commission

EN

Home > News > AI Act enters into force

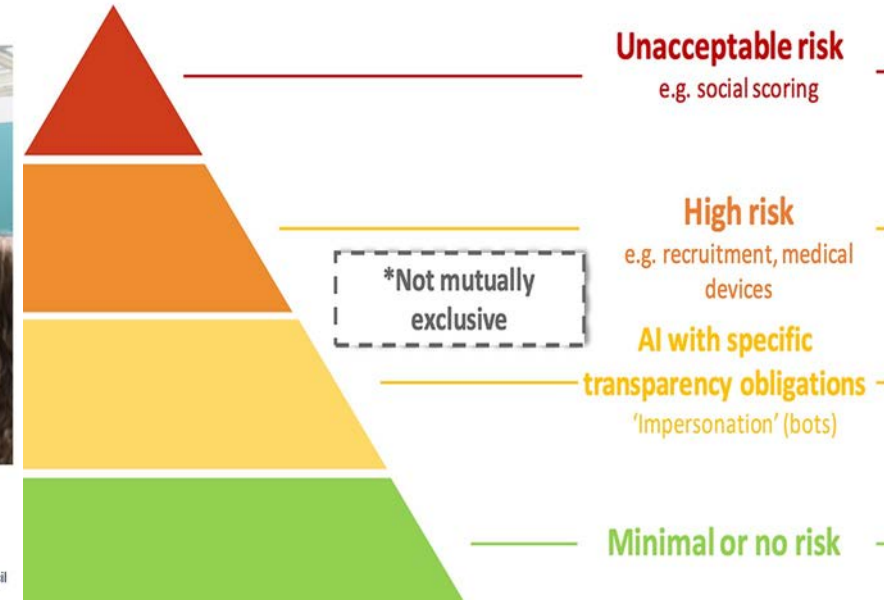
NEWS ARTICLE | 1 August 2024 | Directorate-General for Communication | 2 min read

AI Act enters into force



On 1 August 2024, the European Artificial Intelligence Act (AI Act) enters into force. The Act aims to foster responsible artificial intelligence development and deployment in the EU.

Proposed by the Commission in April 2021 and agreed by the European Parliament and the Council in December 2023, the AI Act addresses potential risks to citizens' health, safety, and fundamental



Source: <https://www.ceps.eu/wp-content/uploads/2021/04/AI-Presentation-CEPS-Webinar-L.-Sioli-23.4.21.pdf?>

Geminn, C. L., Johannes, P. C., Nebel, M., & Bile, T. (2023). **Datenschutzrechtliche Beurteilung von Learning Analytics an Hochschulen in NRW.** <https://hss-opus.ub.ruhr-uni-bochum.de/>

Challenge 2: Weak pedagogical grounding

Learning tracker



What is your goal for this MOOC?

Earn a certificate

Complete the course

Explore the course

Not sure yet

Would these indicators help you in your studies?

Practice quiz attempted

Practice time

Timeliness of submissions

● Successful learners ● You

What would you like to get feedback on?

- | | |
|---|---|
| <input type="checkbox"/> Online presence | <input type="checkbox"/> Active learning time |
| <input checked="" type="checkbox"/> Connectedness | <input checked="" type="checkbox"/> Practice time |
| <input checked="" type="checkbox"/> Time on platform | <input checked="" type="checkbox"/> Practice quiz attempted |
| <input checked="" type="checkbox"/> Revisited material | <input type="checkbox"/> Practice quiz efficiency |
| <input checked="" type="checkbox"/> Timeliness of submissions | <input type="checkbox"/> Graded quiz attempted |

Is there anything else that you would like to know?

Submit

Jivet, I., Wong, J., Scheffel, M., Valle Torre, M., Specht, M., and Drachsler, H. (2021). *Quantum of Choice: How learners' feedback monitoring decisions, goals and self-regulated learning skills are related.*

In *11th LAK21*. ACM, New York, NY, USA, 416–427. ***Best paper LAK21**

Challenge 2: Weak pedagogical grounding

JOURNAL OF LEARNING ANALYTICS SOLAR
SOCIETY OF LEARNING ANALYTICS RESEARCH
Volume 10(2), 1–13. <https://doi.org/10.18608/jla.2023.7913>

A LAK of Direction: Misalignment Between the Goals of Learning Analytics and its Research Scholarship

Benjamin A. Motz¹, Yoav Bergner², Christopher A. Brooks³, Anna Gladden⁴, Geraldine Gray⁵, Charles Lang⁶, Warren Li⁷, Fernando Marmolejo-Ramos⁸, Joshua D. Quick⁹

Abstract
Learning analytic corresponding go data from learner learning environm standards are not the proceedings c published in the J not analyze data and 89% do not at of LA and infer, lik invite critical disc

Notes for Prac

- The de
- In revie of artic
- We inf critical

Keywords
Learning analy
Submitted: 20

JOURNAL OF LEARNING ANALYTICS SOLAR
SOCIETY OF LEARNING ANALYTICS RESEARCH
Volume 10(2), 14–50. <https://doi.org/10.18608/jla.2023.8197>

Aligning the Goals of Learning Analytics with its Research Scholarship: An Open Peer Commentary Approach

Rebecca Ferguson¹, Hassan Khosravi¹, Vitomir Kovanovic¹, Olga Viberg¹, Ashish Aggarwal², Matthieu Brinkhuis³, Simon Buckingham Shum⁴, Lujie Karen Chen⁵, Hendrik Drachsler⁶, Valerie A. Guerrero⁷, Michael Hanses⁸, Caitlin Hayward⁹, Ben Hicks¹⁰, Ioana Jivet¹¹, Kirsty Kitto¹², René Kizilcec¹³, Jason M. Lodge¹⁴, Catherine A. Manly¹⁵, Rebecca L. Matz¹⁶, Michael J. Meaney¹⁷, Xavier Ochoa¹⁸, Brendan A. Schuetze¹⁹, Marco Spruit²⁰, Max van Haastrecht²¹, Anouschka van Leeuwen²², Lars van Rijn²³, Yi-Shan Tsai²⁴, Joshua Weidlich²⁵, Kimberly Williamson²⁶ and Veronica X. Yan²⁷

Keywords
Action research, aptitude-by-treatment interaction, behaviourism, causal models, cognitivism, collaboration, constructivism, curricular analytics, distance education, educational epidemiology, educational psychology, educational science, epistemology, equity, evidence of learning, impact, incentives, inequality, intervention, learning analytics, learning analytics loop, learning analytics research, learning analytics theory, learning outcome, learning outcomes, learning process, learning processes, learning sciences, learning theories, learning-performance distinction, massive open online courses, measuring learning, research projects, social justice, structural, realism, systems, theory, treatment effect heterogeneity

Submitted: 17/08/2023 — **Accepted:** 18/08/2023 — **Published:** 30/08/2023

Learning analytics research should utilize data from learners, measure student learning, and aim to intervene and improve learning environments.

- 37.4% of articles did **NOT** analyze data from learners in an education system
- 71.1% did **NOT** include any measure of learning
- 89.0% did **NOT** attempt to intervene in the learning environment.

Current state of learning analytics research does not align with its defined goals.

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>

Model for Highly Informative Learning Analytics

Learning Analytics (LA)

Psychometrics (PSY)

Data-enriched Learning Analytics (DeLA)

User-
centered
Design

Construct
evidence

Technology
& Data

Bottom - up



High-level interpretations

- Learning model variables
- PSY & LA feedback on: self-regulation, reading comprehension, creative thinking, problem-solving, ...



Low-level features

- Learner performance indicators
- PSY: e.g. information given in a text accessed
- LA: e.g. combine footprints to indicators



Data (Multimodal)

- Observable response
- PSY: highlighted text (explicit behavior)
- LA: location, time, clicks (digital footprints)

Top - down

Evidence
centered
Design

Construct
evidence

Data
collection

Drachsler, H., & Goldhammer, F. (2020). **Learning Analytics and eAssessment—Towards Computational Psychometrics by Combining Psychometrics with Learning Analytics.** In. Burgos, D. (Ed.) (2020). Radical Learning Analytics Solutions. pp. 67-80. Singapore: Springer.

Highly Informative Feedback with Learning Analytics

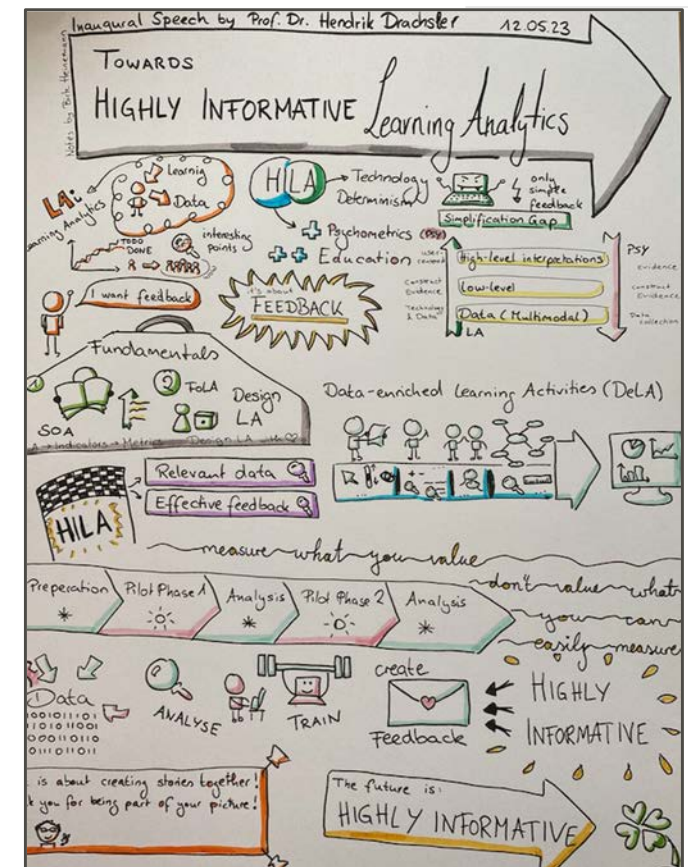


Photo by [Annika Gordon](#) on [Unsplash](#)

*Highly informative feedback goes **beyond feedback on right/wrong**, it provides **correct solutions, hints for personal improvement and competence development** and is ideally given **during the learning process**.*

Highly Informative Learning Analytics in a nutshell

- 1. Focus on micro-level of learning and teaching**
 - a. Individual and group learning*
 - b. Feedback for learners & teachers*
 - c. Considering the learning context and competences of the learners*
- 2. Create Data-enriched Learning Activities (DeLA)**
 - a. Involve LA at the stage of Learning Design*
 - b. Address common learning activities*
 - c. Improve learner outcomes*
- 3. Contribute to evidences about its effects**
 - a. Reliability and validity of LA applications*
 - b. Contribute empirical evidence on LA in practice*
 - c. Release open data sets*

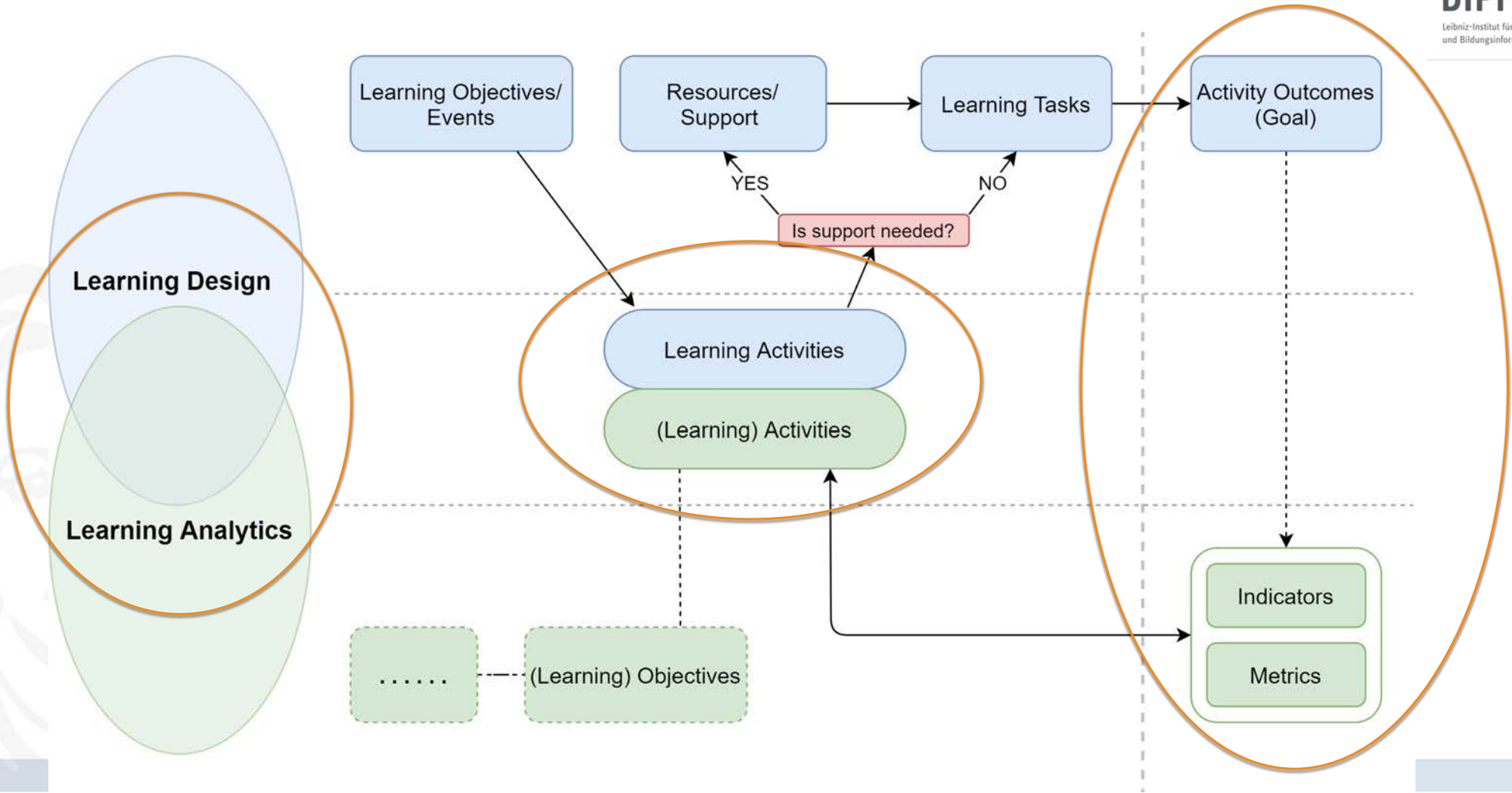


Outline

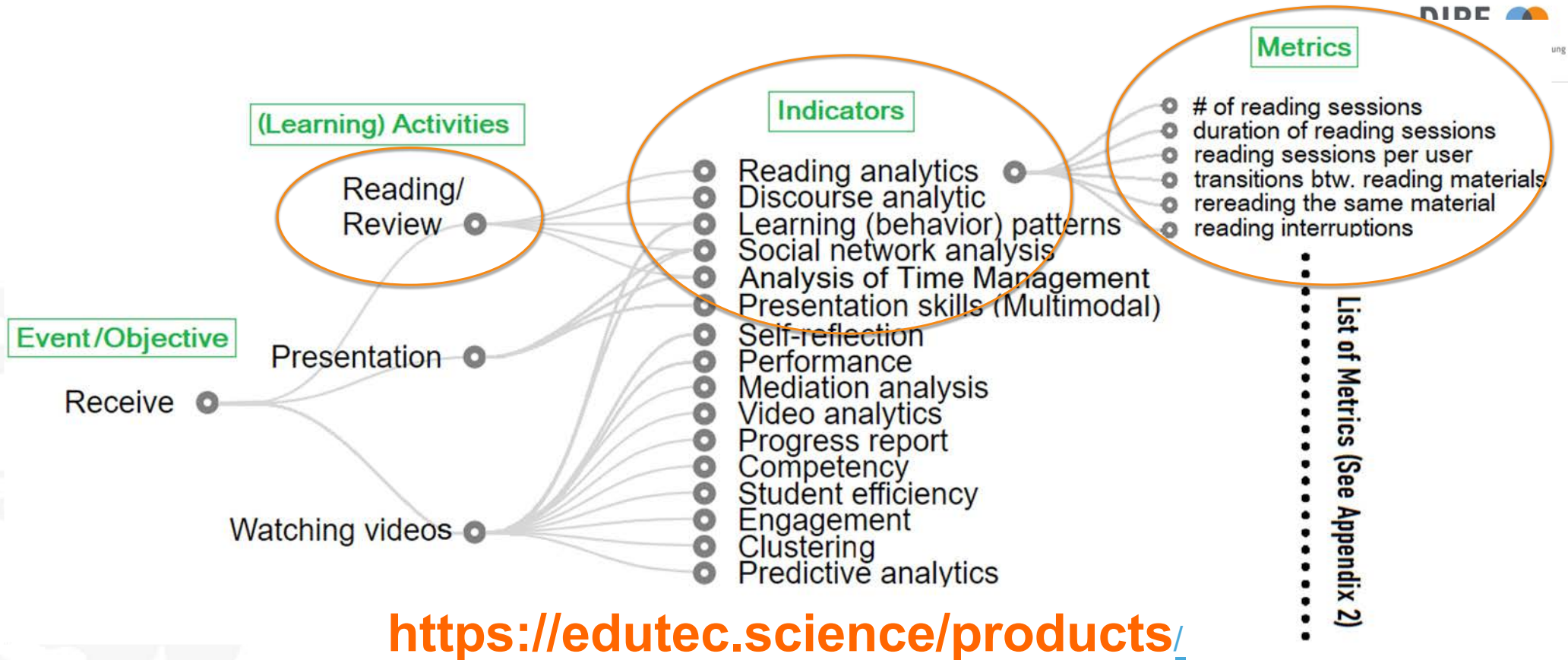
1. Learning Analytics in the Age of AI
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Evidence-based Learning Design



Evidence-based Learning Design



<https://edutec.science/products/>

Ahmad, A., Schneider, J., Griffiths, D., Biedermann, D., Schiffner, D., Greller, W., Drachsler, H. (2022). **Connecting the dots - A literature review on learning analytics indicators from a learning design perspective.** Journal of Computer Assisted Learning. <https://doi.org/10.1111/jcal.12716>

Evidence-based Learning Design




Limited Edition: LAK20 Version

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Schmitz, M., Scheffel, M., Bemelmans, R., & Drachsler, H. (2022). **FoLA2 — A Method for Co-creating Learning Analytics–Supported Learning Design**. *Journal of Learning Analytics*, 9(2), 265-281. <https://doi.org/10.18608/jla.2022.7643>


Evidence-based Learning Design



 How should solar panels be installed on a house to convert as much energy as possible?

Beantworte nun abschließend
Wie sollten Solarzellen

The Solar panels should look at the sun at a 45-degree angle and be mounted to the south, with no shadow, to gain high energy outcomes.

 Mithilfe von Solarbooten kann man sich ohne Benzin auf dem Wasser fortbewegen.
Wie lässt sich die Funktionsweise von Solarbooten erklären?

Wählen Sie eine Antwort:

- Solarzellen auf dem Dach der Solarboote wandeln Strahlungsenergie in elektrische Energie um. Die elektrische Energie wird für einen Motor genutzt.
- Solarzellen auf dem Dach der Solarboote speichern Strahlungsenergie. Die gespeicherte Strahlungsenergie betreibt dann einen Motor.
- Für die Fortbewegung auf dem Wasser wird keine Energie benötigt, da man sich auf dem Wasser ohne Reibung fortbewegen kann.
- Solarzellen auf dem Dach der Solarboote speichern die elektrische Energie des Sonnenlichts. Die elektrische Energie betreibt dann einen Motor.

[Meine Auswahl widerrufen](#)

Kubsch M., Czinczel B., Lossjew J., Wyrwich T., Bednorz D., Bernholt S., Fiedler D., Strauß S., Cress U., Drachsler H., Neumann K. and Rummel N. (2022). **Toward learning progression analytics — Developing learning environments for the automated analysis of learning using evidence-centred design.** Front. Educ. 7:981910.

BETA Version

FoLA

Feedbackorientierte Lern-Designs
und Analytics

inspiriert von FoLA²



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Leibniz-Institut für Bildungsforschung
und Bildungsinformation

<https://FoLA.digital>

Jointly planning, analyzing,
and improving teaching
online

BETA Version

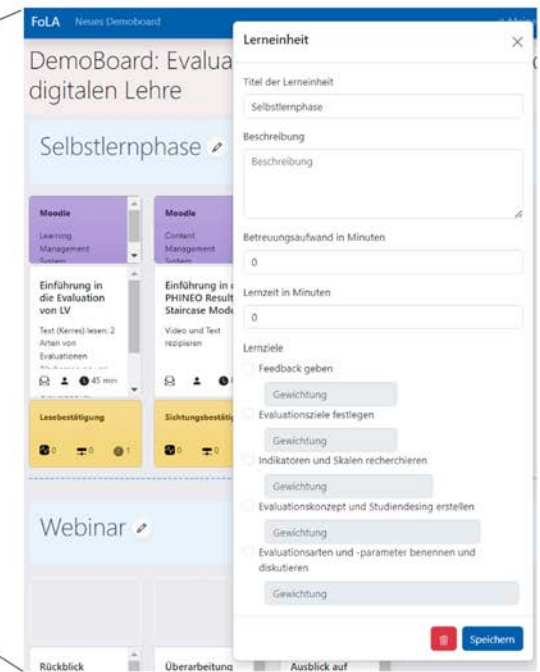
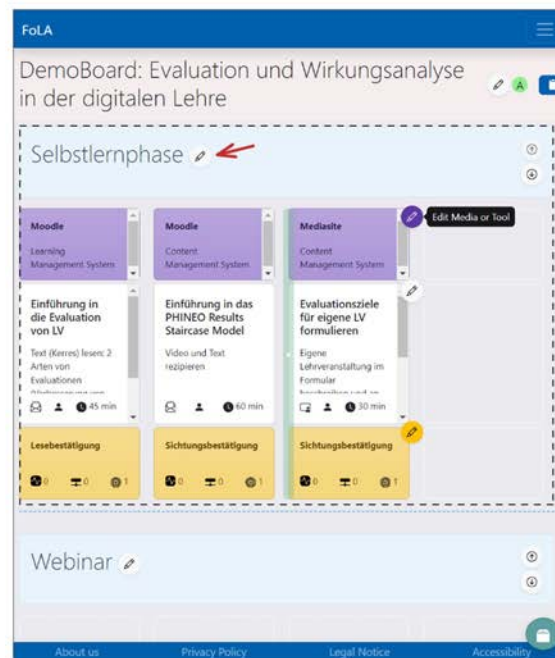
FoLA

Feedbackorientierte Lern-Designs
und Analytics

inspiriert von FoLA²



<https://FoLA.digital>



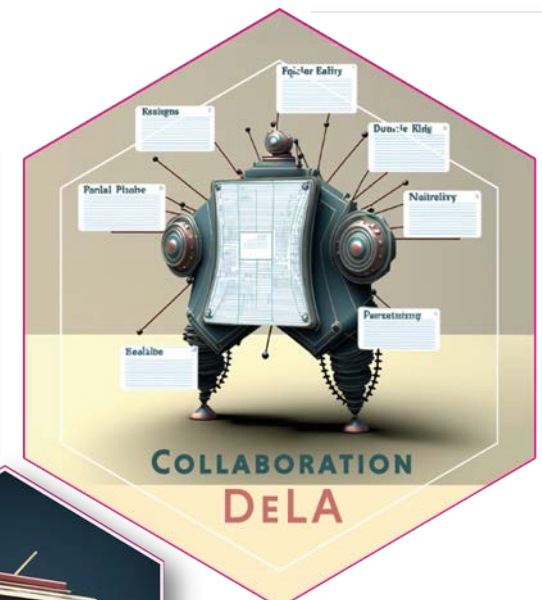
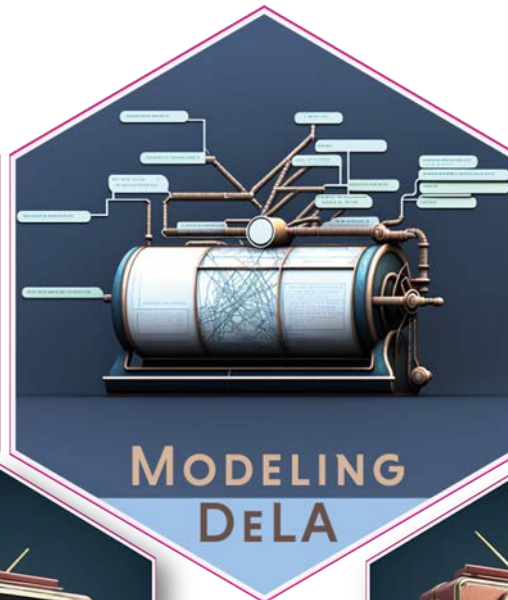
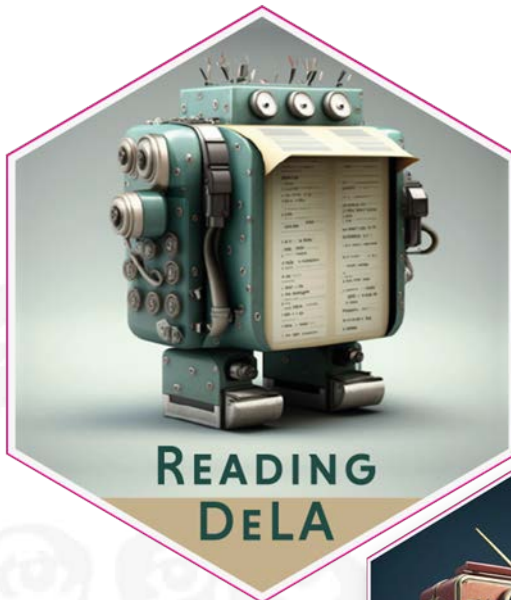
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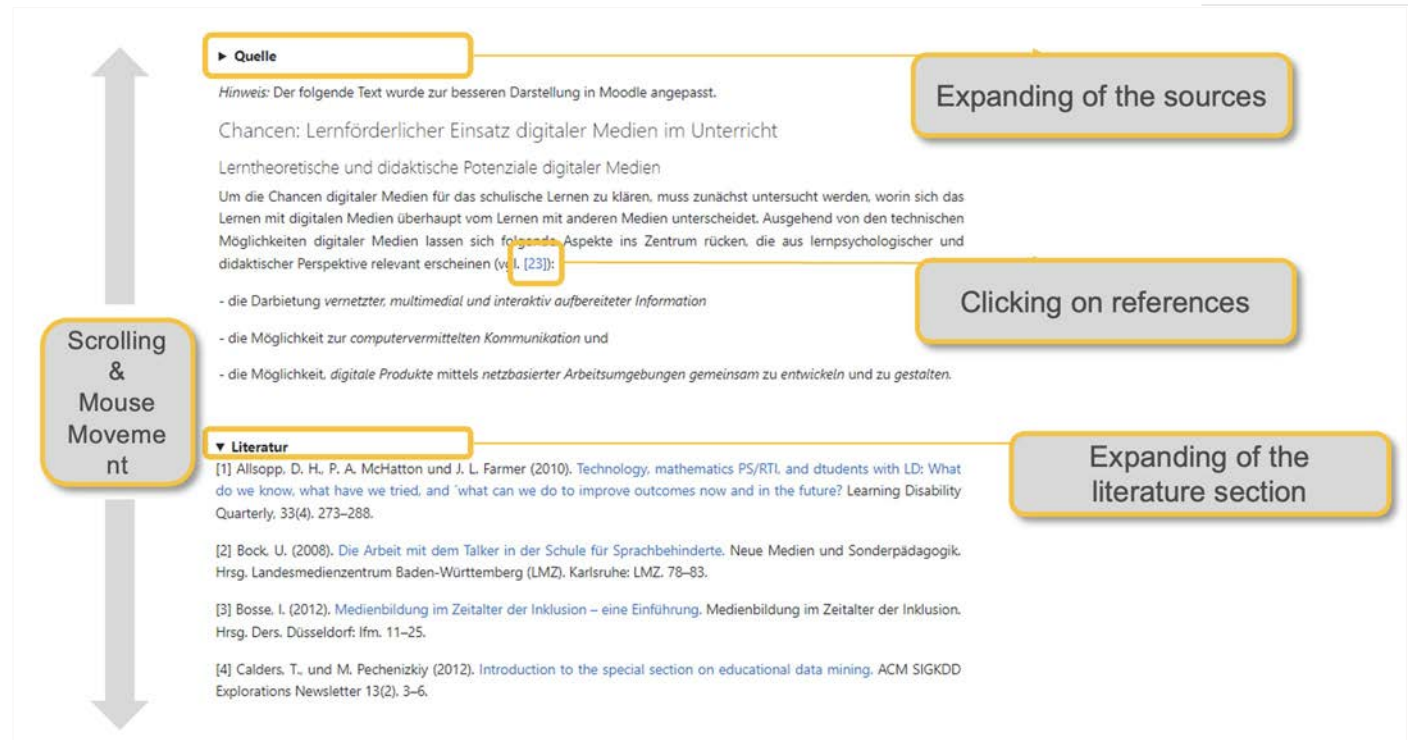
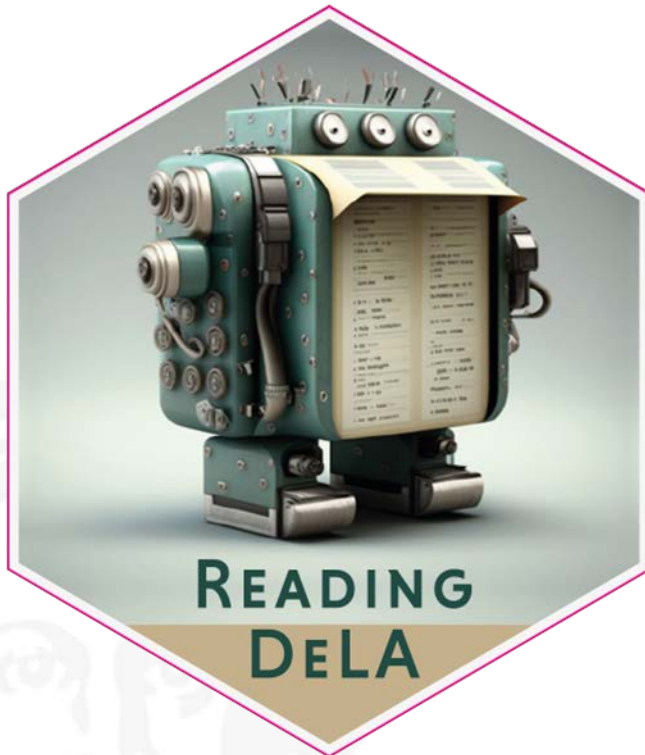
Data-Enriched Learning Activities

DeLA for the most common learning activities.



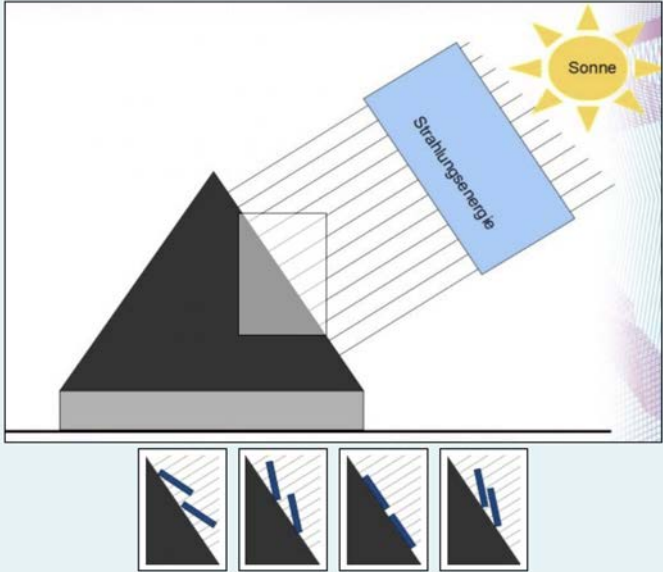
Drachsler, H. (2023). **Towards Highly Informative Learning Analytics.**
<https://doi.org/10.25656/01:26787>

DeLA – Reading Analytics



Biedermann, D., Schneider, J., Ciordas-Hertel, G., Eichmann, B., Hahnel, C., Goldhammer, F., Drachsler, H. (2023). **Detecting the Disengaged Reader – Using Scrolling Data to Predict Disengagement during Reading**. In LAK23: 13th International Learning Analytics and Knowledge Conference. ACM.

DeLA – Writing Analytics



Strahlungsenergie

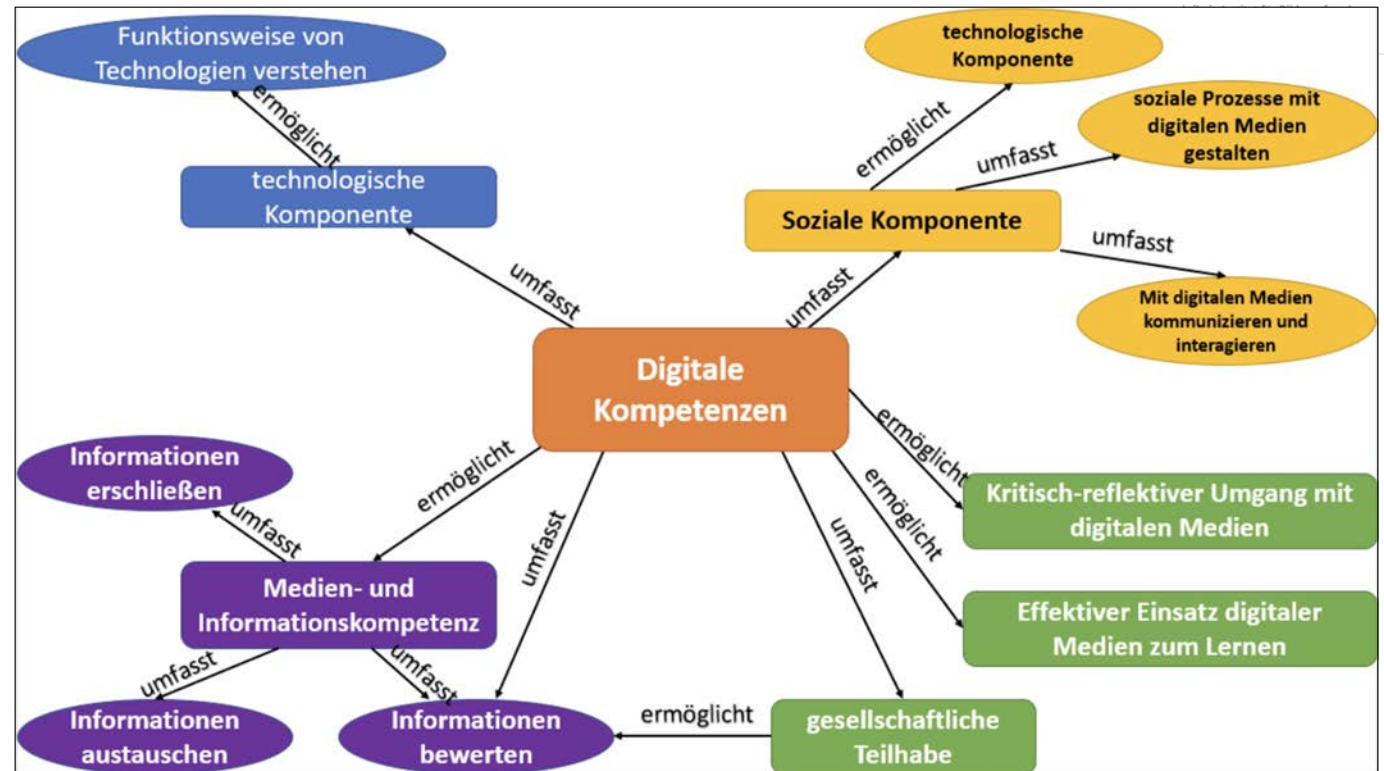
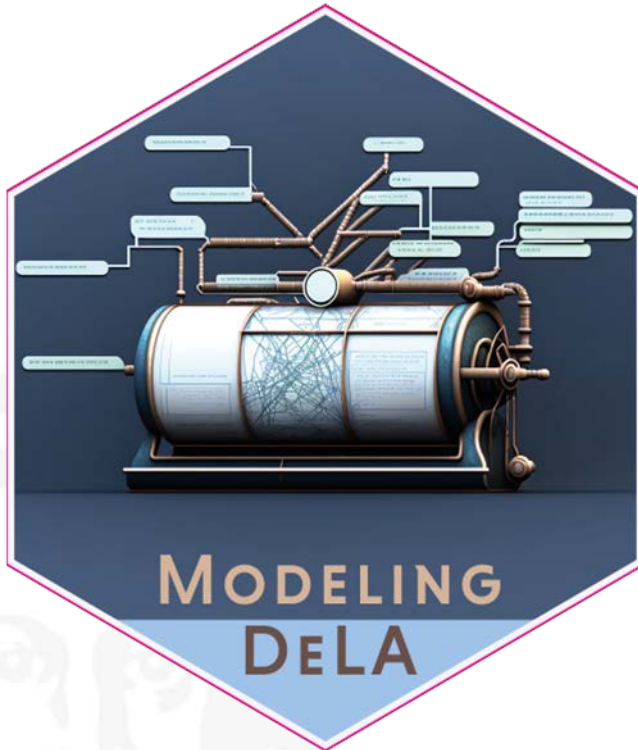
Sonne

Prüfen

Free text answer of students

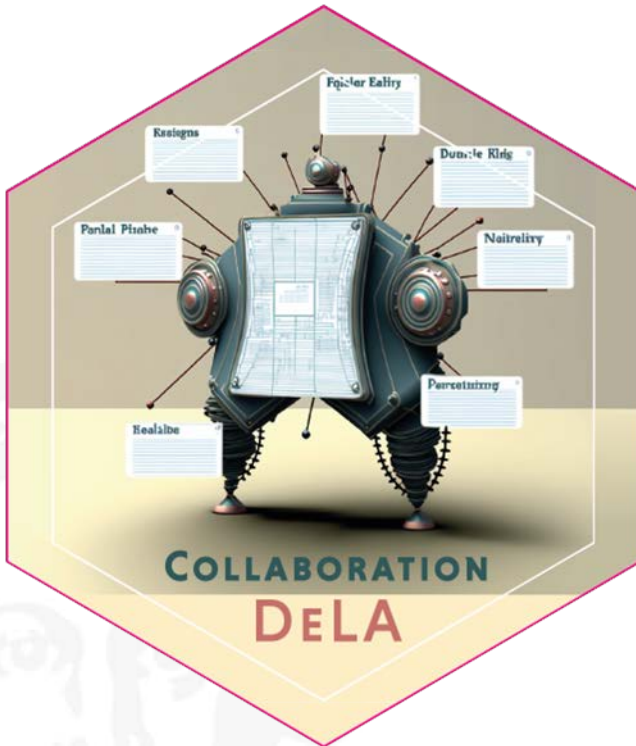
Gombert, S., Di Mitri, D., Karademir, O., Kubsch, M., Kolbe, H., Tautz, S., Grimm, A., Bohm, I., Neumann, K., & Drachsler, H. (2022). **Coding energy knowledge in constructed responses with explainable NLP models**. Journal of Computer Assisted Learning. <https://doi.org/10.1111/jcal.12767>

DeLA – Modeling Analytics



Vossen, P. V., Gasparini, I., Oliveira, E. H. T., Czinczel, B., Harms, U., Menzel, L., Gombert, S., Neumann, K., & Drachler, H. (2024). **Concept map assessment through structure classification**. In Workshop on Automated Evaluation of Learning and Assessment Content, 25th International Conference on Artificial Intelligence in Education (AIED 2024), Recife, Brasil.

DeLA – Collaboration Analytics



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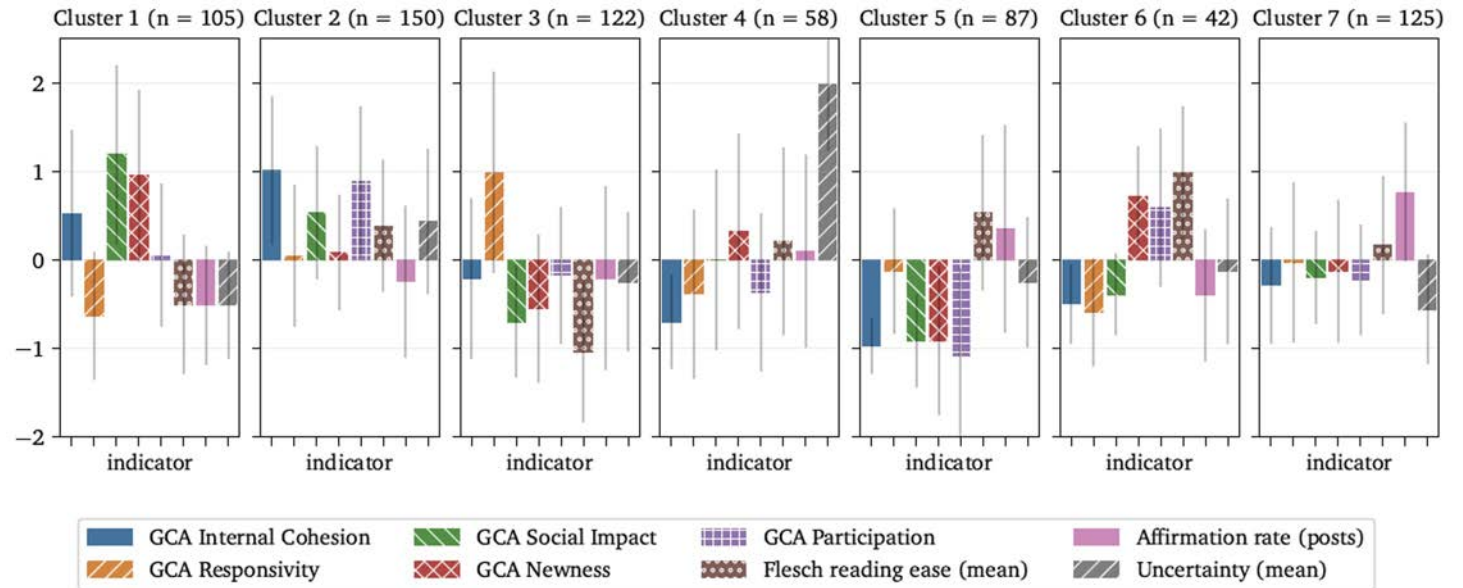
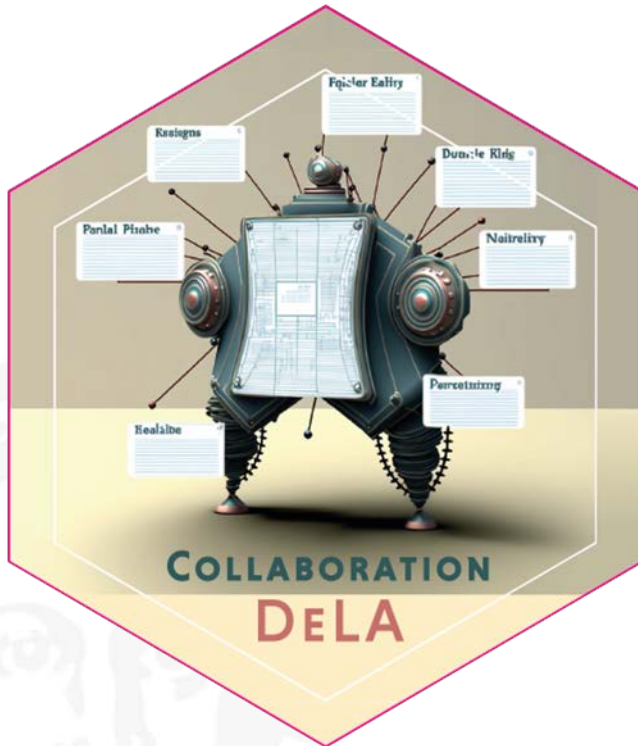
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<input type="checkbox"/>			★	▼ My name is Cynthia	Cynthia Student	Jul 10, 2019 10:14 AM
<input type="checkbox"/>			★	My name is Cynthia	David Student	Jul 10, 2019 10:19 AM
<input type="checkbox"/>			★	▼ My name is Cynthia	Evelyn Instructor	Jul 10, 2019 10:22 AM
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<input type="checkbox"/>			★	My name is Cynthia	Evelyn Instructor	Jul 10, 2019 10:28 AM
<input type="checkbox"/>			★	▶ My name is Evelyn	Evelyn Instructor	Jun 12, 2019 9:54 AM

20 per page [v](#)

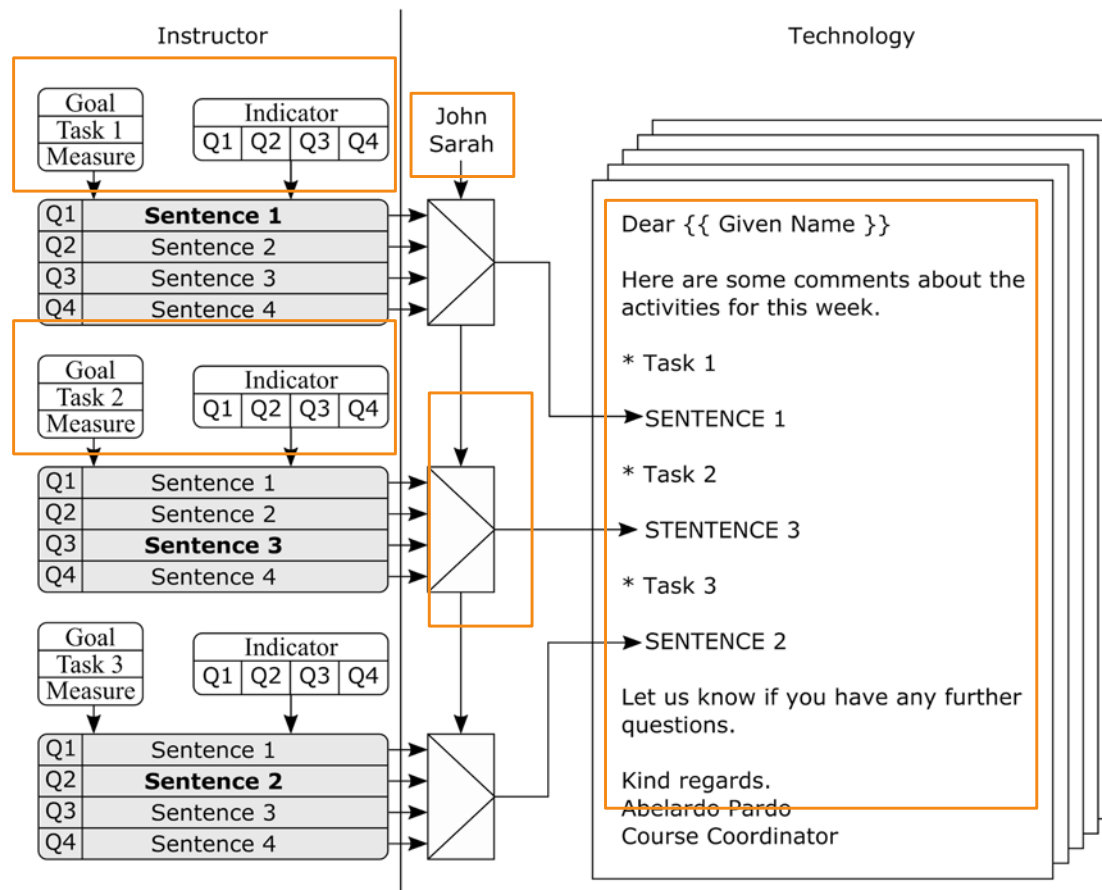
Menzel, L., Gombert, S., Weidlich, J., Fink, A., Frey, A., Drachler, H. (2023). **Why You Should Give Your Students Automatic Process Feedback on Their Collaboration: Evidence from a Randomized Experiment.** EC-TEL 2023. LNCS, vol 14200. Springer, Cham. https://doi.org/10.1007/978-3-031-42682-7_14

DeLA – Collaboration Analytics



Menzel, L., Gombert, S., Weidlich, J., Fink, A., Frey, A., Drachler, H. (2023). **Why You Should Give Your Students Automatic Process Feedback on Their Collaboration: Evidence from a Randomized Experiment.** EC-TEL 2023. LNCS, vol 14200. Springer, Cham. https://doi.org/10.1007/978-3-031-42682-7_14

DeLA – Feedback System



Pardo, A., Bartimote, K., Shum, S. B., Dawson, S., Gao, J., Gašević, D. & Vigentini, L. (2018). **OnTask: Delivering data-informed, personalized learning support actions.** Journal of Learning Analytics, 5(3), 235-249.

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Design-based Research: Co-Design of Teacher Dashboards

Co-design interviews with teachers in three phases:

1. Exploration:

Challenges in monitoring (un)productive learning trajectories in students and providing feedback were identified.

2. Ideation:

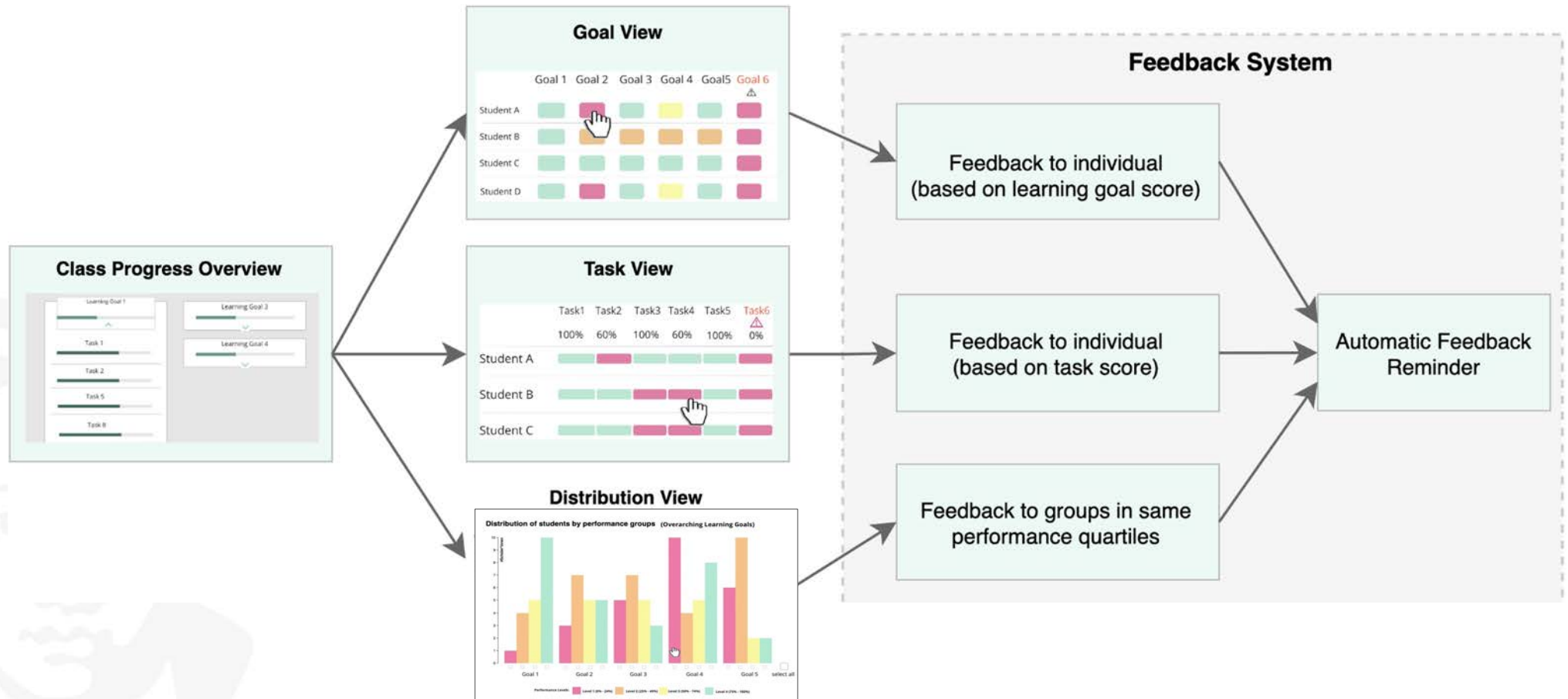
Teachers defined desired features for a dashboard.

3. Evaluation:

Teachers evaluated and improved design prototypes.

Karademir, O., Di Mitri, D., Schneider, J., Jivet, I., Allmang, J., Gombert, S., Kubsch, M., Neumann, K., Drachsler, H. (2024). *[I don't have time! But keep me in the loop: Co-designing requirements for a learning analytics cockpit with teachers.](https://doi.org/10.1111/jcal.12997)* *Journal of Computer Assisted Learning*. <https://doi.org/10.1111/jcal.12997>

Design-based Research: Co-Design of Teacher Dashboards



Karademir, O., Di Mitri, D., Schneider, J., Jivet, I., Allmang, J., Gombert, S., Kubsch, M., Neumann, K., Drachsler, H. (2024). *[I don't have time! But keep me in the loop: Co-designing requirements for a learning analytics cockpit with teachers.](https://doi.org/10.1111/jcal.12997)* *Journal of Computer Assisted Learning*. <https://doi.org/10.1111/jcal.12997>

Design-based Research: Co-Design of Teacher Dashboards

Result:

1. A total of 16 design requirements were identified and implemented.
2. The dashboard should focus on efficiency and adaptability to support teachers in providing individualised feedback.
3. The feedback should consist of positive and competence development-oriented text modules.

Karademir, O., Di Mitri, D., Schneider, J., Jivet, I., Allmang, J., Gombert, S., Kubsch, M., Neumann, K., Drachsler, H. (2024). ***I don't have time! But keep me in the loop: Co-designing requirements for a learning analytics cockpit with teachers.*** *Journal of Computer Assisted Learning*. <https://doi.org/10.1111/jcal.12997>

Developing Content & AI & Dashboards for Teachers

Scores der SuS nach Aufgaben

Schüler*in	Task 28 Avg: 100%	Task 29 Avg: 100%	Task 30 Avg: 100%	Task 31 Avg: 100%	Task 32 Avg: 55%	Task 33 Avg: 55%	Task 34 Avg: 57%	Task 35 Avg: 88%
☐ firstname924 lastnam..	█	█	█	█	█	█	█	█
☐ firstname919 lastnam..	█	█	█	█	█	█	█	█
☐ firstname910 lastnam..	█	█	█	█	█	█	█	█
☐ firstname909 lastnam..	█	█	█	█	█	█	█	█
☐ firstname926 lastnam..	█	█	█	█	█	█	█	█
☐ firstname911 lastnam..	█	█	█	█	█	█	█	█
☐ firstname915 lastnam..	█	█	█	█	█	█	█	█
☐ firstname928 lastnam..	█	█	█	█	█	█	█	█
☐ firstname916 lastnam..	█	█	█	█	█	█	█	█
☐ firstname914 lastnam..	█	█	█	█	█	█	█	█

Quiz: Zusammenfassung

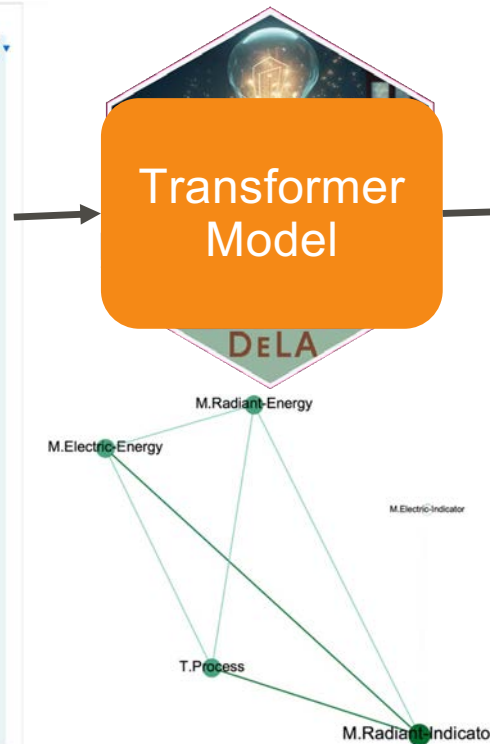
Frage: "Beantworte nun abschließend die Frage: Wie sollten Solarzellen an einem Haus angebracht werden, um möglichst viel Energie umzuwandeln zu können?"

Antwort: Sie sollten nach Süden, senkrecht zur den Sonnenstrahlen angebracht werden und möglichst kein Schatten auf der Zelle haben. Eine möglichst große Fläche führt zu viel Helligkeit, so kann viel Strahlungsenergie in elektrische Energie umgewandelt werden.

Score: 75% (Freitext)

Score pro Wissensselement:

- Elektrische Energie (Wissen): 50%
- Strahlungsenergie (Wissen): 100%
- Umwandlung (Wissen): 100%
- Erklären: 100%
- Energieformen (Kompetenz): 0%
- Umwandlung (Kompetenz): 100%



How should solar panels be installed on a house to convert as much energy as possible?

The Solar panels should look at the sun at a 45-degree angle and be mounted to the south, with no shadow, to gain high energy outcomes.

Gombert, S., Di Mitri, D., Karademir, O., Kubsch, M., Kolbe, H., Tautz, S., Grimm, A., Bohm, I., Neumann, K., & Drachsler, H. (2022). **Coding energy knowledge in constructed responses with explainable NLP models.** Journal of Computer Assisted Learning. <https://doi.org/10.1111/jcal.12767>

Developing Content & AI & Dashboards for Teachers

Teacher Dashboard and Feedback System

Scores der SuS nach Aufgaben

Schüler*in	Task 28 Avg: 100%	Task 29 Avg: 100%	Task 30 Avg: 100%	Task 31 Avg: 100%	Task 32 Avg: 55%	Task 33 Avg: 55%	Task 34 Avg: 57%	Task 35 Avg: 88%
<input type="checkbox"/> firstname924 lastnam..	█	█	█	█	█	█	█	█
<input type="checkbox"/> firstname919 lastnam..	█	█	█	█	█	█	█	█
<input type="checkbox"/> firstname910 lastnam..	█	█	█	█	█	█	█	█
<input type="checkbox"/> firstnme909 lastnam..	█	█	█	█	█	█	█	█
<input type="checkbox"/> firstnme926 lastnam..	█	█	█	█	█	█	█	█
<input type="checkbox"/> firstnme911 lastnam..	█	█	█	█	█	█	█	█
<input type="checkbox"/> firstnme915 lastnam..	█	█	█	█	█	█	█	█
<input type="checkbox"/> firstnme928 lastnam..	█	█	█	█	█	█	█	█
<input type="checkbox"/> firstnme916 lastnam..	█	█	█	█	█	█	█	█
<input type="checkbox"/> firstnme914 lastnam..	█	█	█	█	█	█	█	█

Quiz: Zusammenfassung

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 Umwandlung (Wissen): 100%
 Erklären: 100%
 Energieformen (Kompetenz): 0%
 Umwandlung (Kompetenz): 100%

Feedback

Selected Student: firstname822 lastnam.. Overall Score: 69%

👍 What went well?

You have already answered some correctly and have documented your results well in the experiments.

👎 What didn't go so well?

It seems that you have difficulties with naming forms of energy (see task 23).

💡 Recommendation

Please try to use the terminology on energy forms we used in class.

Gombert, S., Di Mitri, D., Karademir, O., Kubsch, M., Kolbe, H., Tautz, S., Grimm, A., Bohm, I., Neumann, K., & Drachsler, H. (2022). **Coding energy knowledge in constructed responses with explainable NLP models.** Journal of Computer Assisted Learning. <https://doi.org/10.1111/jcal.12767>

Outline

1. Learning Analytics in the Age of AI
2. Highly Informative Learning Analytics (HILA)
3. The role of Learning Design
4. Data-enriched Learning Analytics (DeLA)
5. Design-based Research (DBR)
6. Empirical findings
7. Take away messages



Empirical findings from an intervention study

Intervention study in secondary education with:
Teacher (n=16), Classes (n=22), und students (n=403).

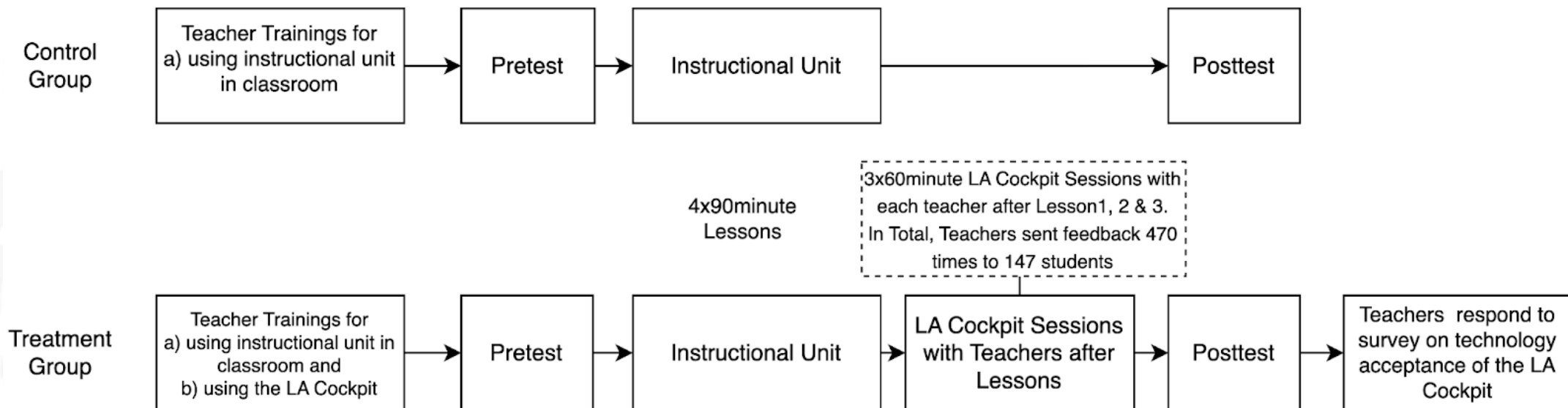
What are the long-term effects of the teacher dashboard on students?

Measurements:

1. Technology acceptance of the dashboard by teachers.
2. Analysis of teachers' feedback practices.
3. Students' knowledge gain (pre- and post-test).

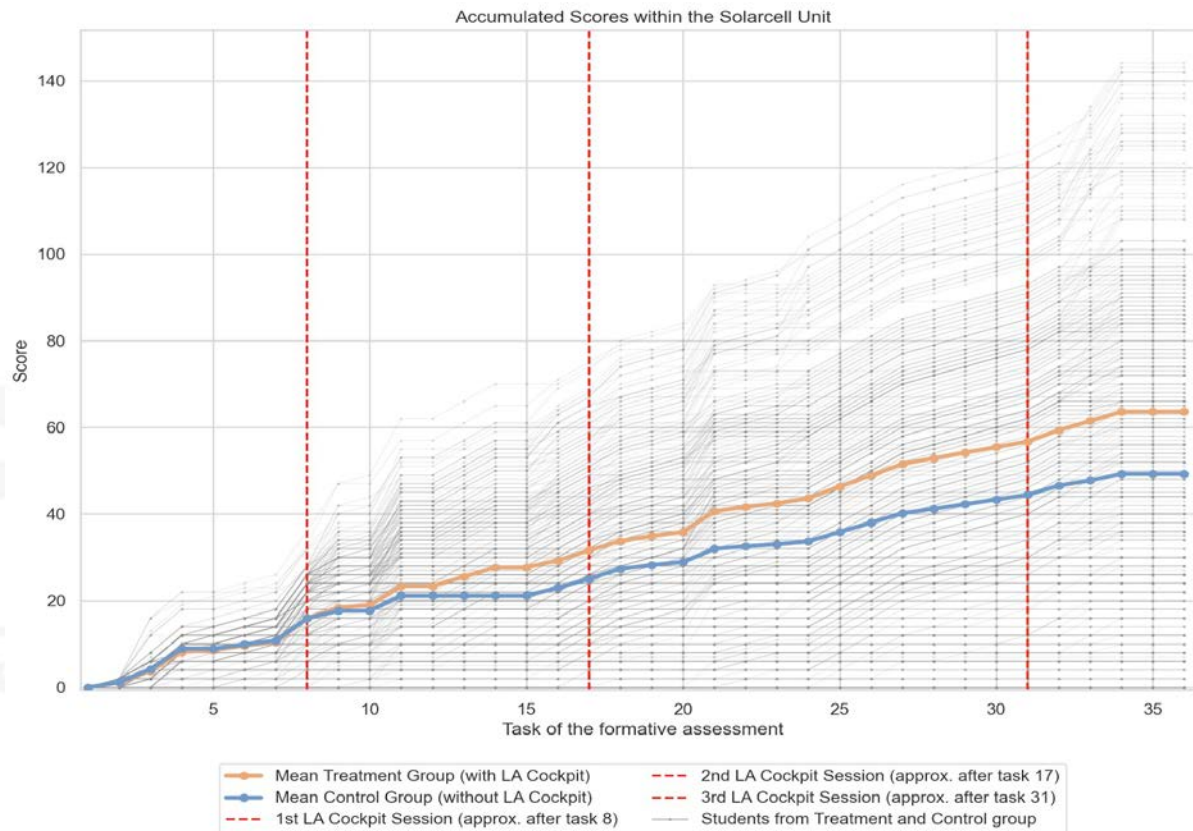
Karademir, O., Borgards, L., Di Mitri, D., Strauß, S., Kubsch, M., Brobeil, M., Grimm, A., Gombert, S., Rummel, N., Neumann, K., & Drachsler, H. (2024). [Following the Impact Chain of the LA Cockpit: An Intervention Study Investigating a Teacher Dashboard's Effect on Student Learning](https://doi.org/10.18608/jla.2024.8399). Journal of Learning Analytics, 1-14.
<https://doi.org/10.18608/jla.2024.8399>

Empirical findings from an intervention study



Karademir, O., Borgards, L., Di Mitri, D., Strauß, S., Kubsch, M., Brobeil, M., Grimm, A., Gombert, S., Rummel, N., Neumann, K., & Drachsler, H. (2024). [Following the Impact Chain of the LA Cockpit: An Intervention Study Investigating a Teacher Dashboard's Effect on Student Learning](https://doi.org/10.18608/jla.2024.8399). *Journal of Learning Analytics*, 1-14. <https://doi.org/10.18608/jla.2024.8399>

Empirical findings from an intervention study



Each reflection moment of the teachers (**red-line**) with the dashboard showed an increase of knowledge for the students in the treatment group (**orange-line**) compared to the control group (**blue-line**).

Karademir, O., Borgards, L., Di Mitri, D., Strauß, S., Kubsch, M., Brobeil, M., Grimm, A., Gombert, S., Rummel, N., Neumann, K., & Drachsler, H. (2024). [Following the Impact Chain of the LA Cockpit: An Intervention Study Investigating a Teacher Dashboard's Effect on Student Learning](https://doi.org/10.18608/jla.2024.8399). *Journal of Learning Analytics*, 1-14.
<https://doi.org/10.18608/jla.2024.8399>

Empirical findings from an intervention study

Intervention study in secondary education with:

Teacher (n=16), Classes (n=22), und students (n=403).

What are the long-term effects of the teacher dashboard on students?

Results:

- Teachers found the dashboard useful for providing feedback.
- A balanced distribution of feedback given by the teachers across all performance levels was observed.
- A greater knowledge gain was observed in the students in the treatment group.

Outline

1. Learning Analytics in the Age of AI
2. Highly Informative Learning Analytics (HILA)
3. The role of Learning Design
4. Data-enriched Learning Analytics (DeLA)
5. Design-based Research (DBR)
6. Some empirical evidences
7. Take away messages



HILA:LPA: Take away messages

One of the first systematic investigations into the chain of effects of teacher dashboard-based feedback on students.

Results:

- The collaboratively designed dashboard supports effective teacher feedback.
- Led to higher learning gains for students.
- The dashboard was found to be practical for classroom use.

Research contributions:

- Addresses the lack of empirical studies on learning analytics and teacher dashboards that impact students.
- Expands the empirical evidence on the effects of Learning Analytics interventions on students.



How should solar panels be installed on a house to convert as much energy as possible?



The Solar panels should look at the sun at a 45-degree angle and be mounted to the south, with no shadow, to gain high energy outcomes.



WRITING
DELA

Schüler*in	Task 28 Avg: 100%	Task 34 Avg: 57%	Task 35 Avg: 88%
firstname924 lastname	█	█	█
firstname919 lastname	█	█	█
firstname910 lastname	█	█	█
firstname909 lastname	█	█	█
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firstname911 lastname	█	█	█
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firstname914 lastname	█	█	█

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Score: 75% (Pretext)

Score pro Wissensbereich:
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Umwandlung (Wissen): 100%
Erklären: 50%
Energieformen (Kompetenz): 0%
Umwandlung (Kompetenz): 100%

What is needed in the age of the AI hype

Informed Precision



While the integration of AI and Learning Analytics holds considerable promise for enhancing educational practices, it is critical to approach these technologies with:

1. Context-specific applications,
2. Empirical validation,
3. and the diverse needs of learners.

The **success** of AI will depend not just on **technology**, but on our commitment **to** **designing, testing, and refining** these tools in ways that truly **support meaningful learning outcomes for all students.**

Many thanks for your attention.



Measure what you value; don't value what you can easily measure.



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[hendrik.drachsler](https://www.linkedin.com/in/hendrik.drachsler)



www.edutec.science