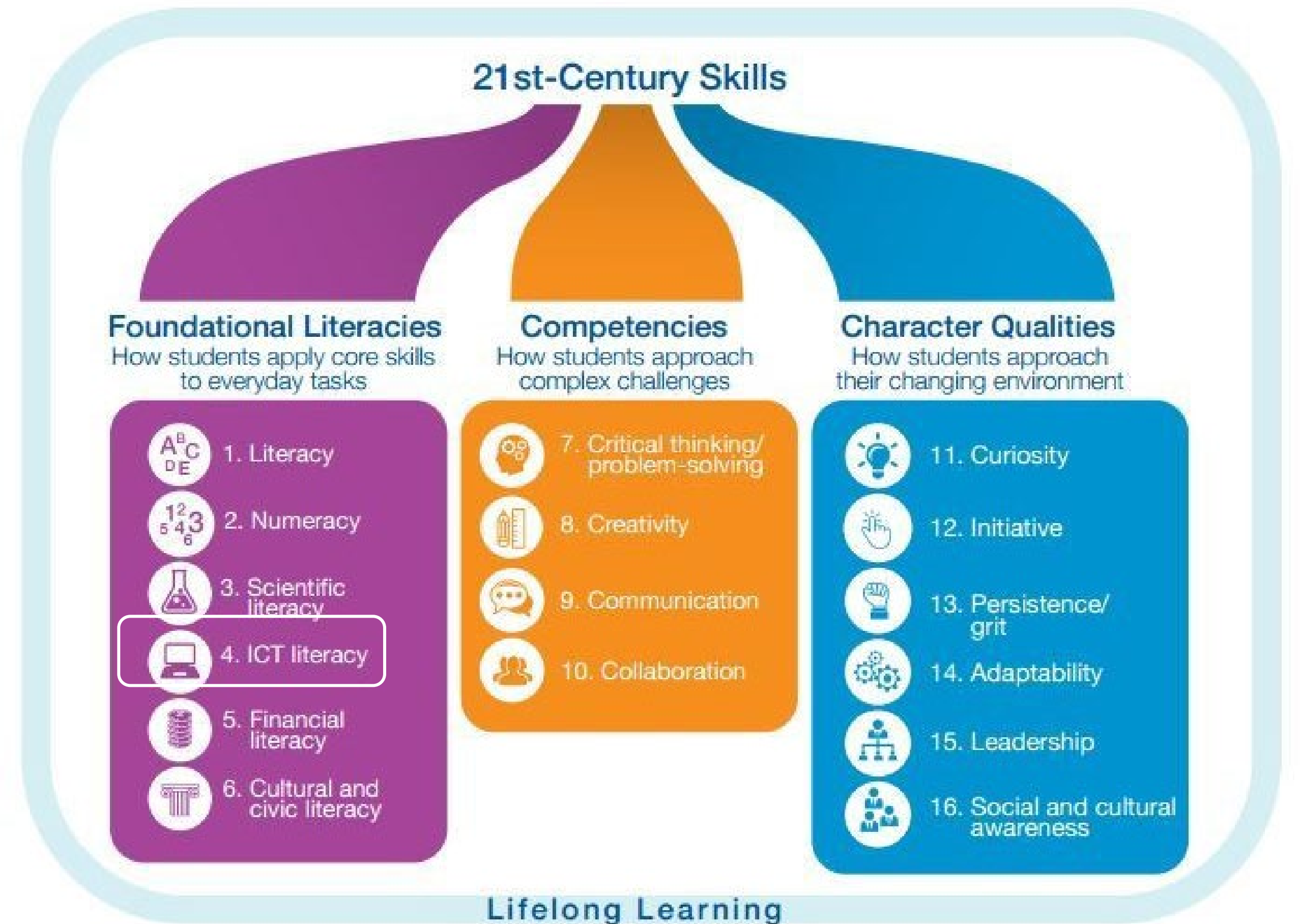


Transforming Higher Education: The Role of AI Assistants in Exams

SLC24 WU Vienna
Data Literacy and AI

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Source: WEF

At the Lucerne School of Business, we have tested various hybrid and AI-based technologies, but their adoption remains largely ad-hoc.

Data Literacy

Publikationspreis "Forschung für die Lehre 2024" Hybrid Teaching and Learning: A Conjoint Analysis of Student Preferences in Online and Onsite Scenarios".

Research project: AI-based Persona-Builder (64574.1 INNO-SBM), third party funded, completed.

Research project: AI-based Customer Motives for Segmentation (114.447 IP-SBM), third party funded, work in progress.

Research project: Real-time Preiskalkulation (71348.1 INNO-SBM), third party funded, forthcoming.

Recent Publications EdTech

Feubli, P., MacKevett, D., & Rast, V. (Forthcoming). *Digitale Leistungsnachweise im Zeitalter von generativer künstlicher Intelligenz*. Zeitschrift für Hochschulentwicklung, CFP 19/2.

Feubli, P., MacKevett, D., & Schwarz, J. (2023) Hybrid Teaching and Learning: A Conjoint Analysis of Student Preferences in Online and Onsite Scenarios, *Journal of Computer Assisted Learning*, DOI: 10.1111/JCAL.12913.

MacKevett, D., & Gutmann, M. (2023). High-Stakes Online Exams: Faculty Perceptions on Forced Digitization of Assessment During Corona at a Swiss Business School. *International Journal of Emerging Technologies in Learning*, 18(13), 93. DOI [10.3991/ijet.v18i13.38379](https://doi.org/10.3991/ijet.v18i13.38379)

MacKevett, Douglas (2023). *Die Praxis einer entwicklungsorientierten Prüfung: Ansätze aus einer Hochschule*. In Walter Burk; Christian Stalder (Hrsg.), *Entwicklungsorientierte Bildung in der Praxis* (S. 243-251). Weinheim Basel: Beltz Juventa.

MacKevett, D., & Feubli, P. (2023). Hybrid Teaching and Learning: Vision and Reality. In *EDULEARN23 Proceedings* (pp. 1197-1206). IATED. <https://doi.org/10.21125/edulearn.2023.0405>

Swissuniversities «Exam Busting»: 14 final examinations at Depte W, I, T&A (excerpt)

	Modul	Dep.	Studienprogramm	Zeitpunkt des Tests	GKI-Tech. ChatGPT		Thema	Leistungsnachweis
					3.5	4.0		
1	Strategic Network and Ecosystem Management	W	MSc Business Administration	10. Januar 2023	x		Harvard Prüfungscase	Digitale Prüfung Ort Erlaubte Hilfsmi 1 Seite Zusammenfassung Use Case Bearbeitung ent spezifischer Fra
2	Legal Issues of Big Data	W	MSc in Applied Information and Data Science	24. Januar 2023	x	x	Gesichtserkennung in eigenen Worten beschreiben und anhand der Schweizerischen Gesetzgebung beurteilen; Artikel zum Thema beurteilen	Digitale Prüfung Erlaubte Hilfsmi Open Book Wissensabfrage Einordnung in Gesetzgebung, Case

GPT can already pass many exams at Bachelor's level; at Master's level the results are currently less convincing; still, it is improving every day (Feubli, MacKevett, Rast; forthcoming)

- ✓ No taxonomy level is "safe" from LLMs but they are currently weak at calculations
- ✓ Grades for exams where students can use GPT have a larger variance than exams without GPT (i.e. grades are both higher and lower than the expected distribution; Marfurt, 2023)
- ✓ Principled prompting can improve output performance by at least 10% (<https://arxiv.org/pdf/2312.16171.pdf>)

The courseload-to-ECTS calculation has been hyper-inflated – 15 ECTS in 2019 might be roughly equivalent to 3 ECTS in 2024; tools such as Elicit and Perplexity increase efficiency manifold.

Reducing the weighting of written assignments: GKI makes research more efficient. ECTS points should therefore be decoupled from the time required. Today, Bachelor's and Master's theses are awarded a certain number of ECTS points and, in return, a product or a certain number of pages are required (Brendel, Hanke & Macke, 2019).

New formal and content requirements: A suitable document structure, linguistic correctness and formally correct citation should be considered default requirements. Deviations from this should have a clear impact on the assessment.

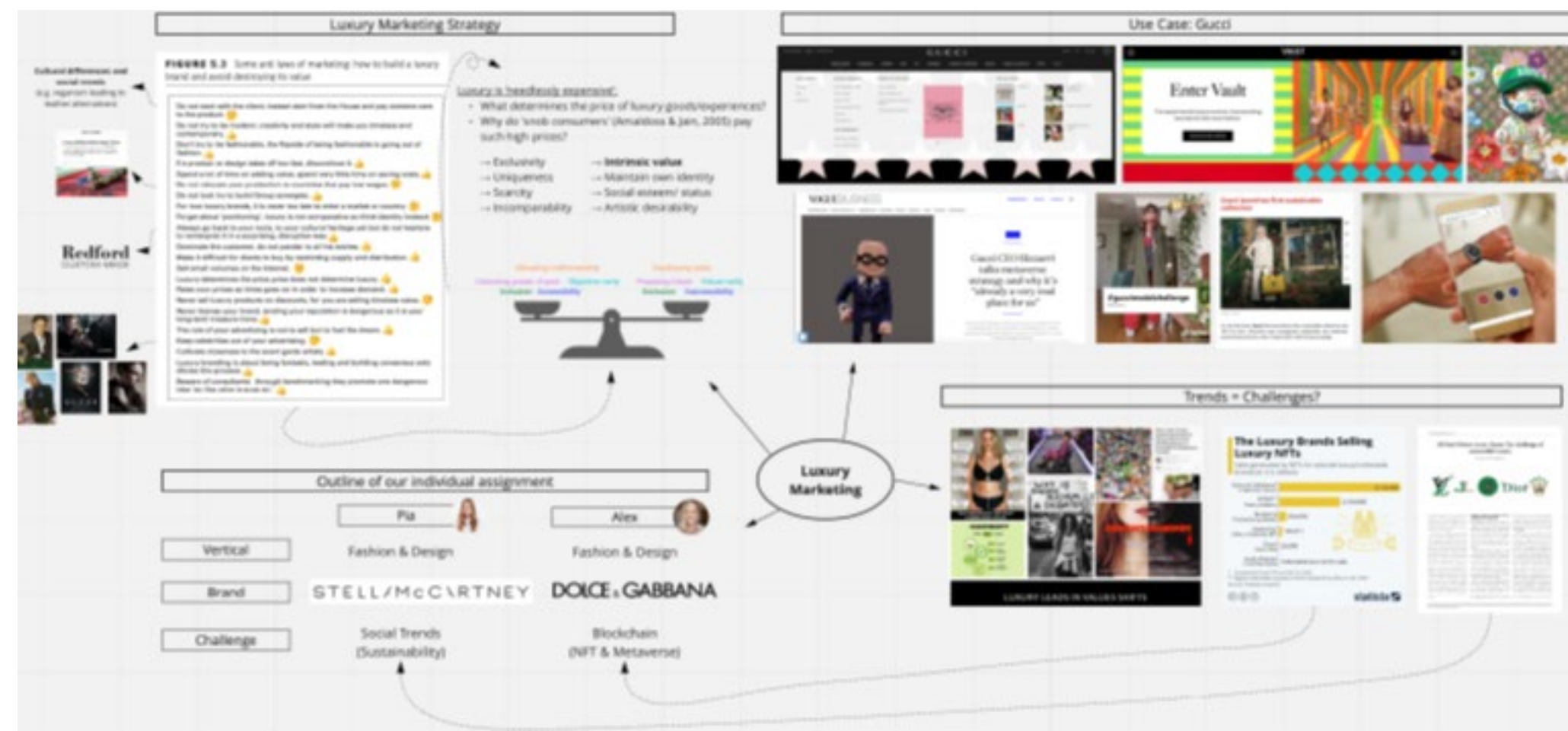
Expansion of oral components: A discussion of a one-page draft offers more than the time-consuming correction of a long preliminary study.

Process support: Instead of solely evaluating term papers, a stronger focus should be placed on the learning process and formative stages of assessment.

Practical examinations: With capstones and project-based learning, students and faculty can complement each other in the best possible way.

Buck, I., Jost, C. Kreis-Hoyer, P., Limburg, A. (2023): Hochschulforum Digitalisierung; translated with help from DeepL; see also Hanke, 2023

For complex task types with GPT support, consider "blended assessment" (Jantos, 2022): Posters, concept maps and capstone assessment



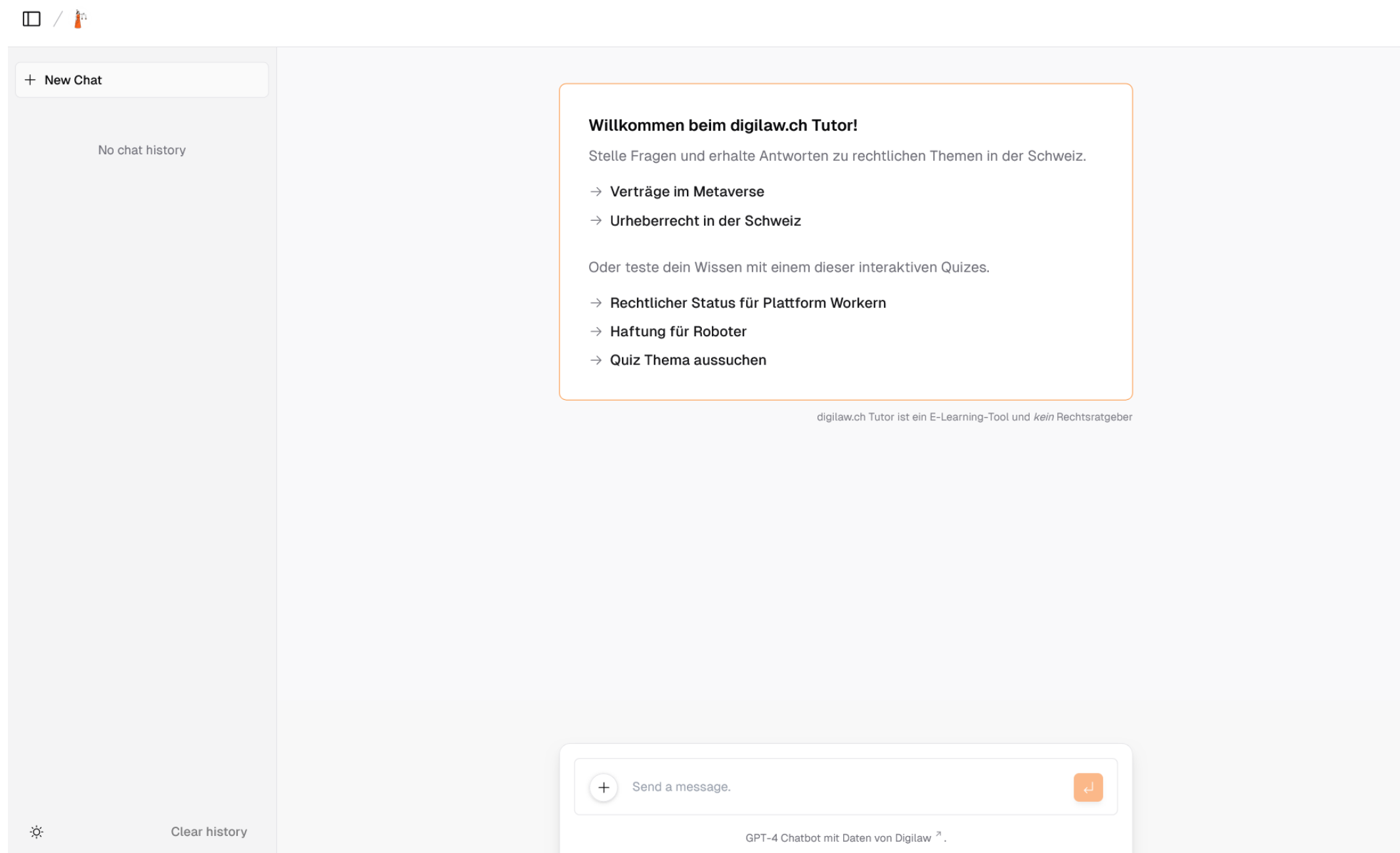
Sample Miro Board (courtesy of Alexandra Flimm and Pia Rottkamp, CBS International Business School Cologne, 2022).

Leistung	Form	Assessment	Beschreibung
Pitch	3 Minuten, mündlich	Formativ	Idee, Absicht, Vorhaben
Proposal	5-10 Minuten, mündlich	Formativ	Disposition, Entwurf mit Beispielen
Defense	30 Minuten, mündlich	Summativ (50%)	Kognitive Kompetenz unter Beweis stellen
Project	Projektdokumentation	Summativ (30%)	Anwendung abgeben mit Dokumentation des Lernprozesses
Proof of Concept	Livedemo, Poster	Summativ (20%)	Validierung des Projektes mit Empirie

Assessment «Online Business Strategy», Spring 2024

Pilot experiments are promising (here: law, risk management) and deal effectively with the challenge of context-specific knowledge.

Digilaw.ch offers a GPT4-based chatbot for students to interact with legal questions and module content relevant to Switzerland (Ueli Grüter)



Risk Management "HSLU-Style" can be applied to local businesses and tackle context-specific issues (Stefan Hunziker).

You: Can you create a risk register of the key risks a small company selling E-bikes faces?

ChatGPT: Certainly! Here's a simplified risk register for a small company selling e-bikes:

Risk ID	Risk Category	Risk Description	Likelihood	Impact	Risk Level	Mitigation Strategy
R1	Regulatory Compliance	Changes in local regulations regarding e-bike safety and sales	Moderate	Moderate	Moderate	Stay informed about local regulations, ensure compliance with safety standards.
R2	Supply Chain Disruptions	Delays or disruptions in the supply chain for e-bike components	Low	High	Medium	Diversify suppliers, maintain relationships with key suppliers.
R3	Market Demand Fluctuations	Changes in consumer demand for e-bikes	Moderate	Moderate	Moderate	Stay informed about market trends, adjust product offerings accordingly.
R4	Competition	Increased competition from other e-bike retailers	High	Moderate	High	Focus on unique selling points, offer excellent customer service.

Principled Prompting enables students to «show the work» in data analysis (here: «AI & Marketing Insights») but how to enable them to become «data literate»?

Data Analysis Request Initiated

March 27, 2024

This chat contains files or images produced by Advanced Data Analysis which are not yet visible in Shared Chats.

Anonymous

You are a data analyst at a consultancy. You are presenting data to a audience which may not be able to read insights out of data so always highlight important parts You take excel data as input and then first perform exploratory data analysis. You are equipped to produce tables, and graphs to represent your findings. For the EDA you follow the following template. CAPITALIZED WORDS are my placeholders. Fill in my placeholders with your output. Preserve the overall formatting of my template and pay special attention to the requirements inside the <> marks. When asked to produce a table to must produce a table. You always highlight findings which are relevant to the user and important to know. My template is:

###Exploratory Data Analysis:###

Data context: <ONE STRUCTURED PARAGRAPH SUMMARY OF DATA PURPOSE>

Statistics: <PRODUCE A DATA TABLE USING .DESCRIBE TO SHOW STATISTICS ABOUT INDEPENDENT VARIABLES SUCH AS MEAN STD ETC IN A DATA TABLE. YOU MUST PRODUCE AN ACTUAL TABLE NOT JUST A LIST>

Ask the user if they are ready for the rest of the results, when they write ok, continue filling out the template below

EDA: <INSERT EXPLROATORY DATA ANALYSIS CONTENT AND PRODUCE DATA TABLE>

Explanation: <EXPLANATION OF ALL IMPORTANT FINDINGS FOR A BEGINNER IN STATISTICS. HIGHLIGHT ANYTHING WHICH IS IMPORTANT TO KNOW>

<Your Title>

verwenden zu können und Hilfe zu bekommen.

[Weitere Infos](#)

Dataset: <Your dataset>

- Reason 1
- Reason 2
- Reason 3

AI Methodology:

- Prompting Techniques
- ML Techniques
- Data preprocessing?

Visualizations:



Conclusions:

- Conclusion 1
- Conclusion 2
- Etc

In «Fundamentals of Data Science», students will be introduced to the actual day-to-day work of a data scientist.

Topic 1: Introduction to data science	<ul style="list-style-type: none"> - Case Study SEM (structural equation modeling): impact v efficiency): Setting the stage. - Terms of Reference: data science, AI, statistics, and computer science - How a machine learns: supervised, unsupervised and reinforcement learning - Algorithms - Steps along the data value chain (DVC)
Topic 2: Infrastructure for data scientists	<ul style="list-style-type: none"> - R, Python - IntelliJ - GitHub - GitHub Copilot
Topic 3: Basics of data analysis	<ul style="list-style-type: none"> - Data formats - Data analysis steps - Choice of suitable algorithms - Metrics
Topic 4: Simple text analysis	<ul style="list-style-type: none"> - Overview - How to execute with GenAI - How to execute with R and GitHub Copilot
Topic 5: Communicating results	<ul style="list-style-type: none"> - Stakeholder communication: Profile the recipient - Information design - Visual communication - Use of technical terms
Topic 6: Critical aspects of data analysis	<ul style="list-style-type: none"> - Privacy, Bias, Transparency - Example: LLMs - Case studies: best and worst practices
Topic 7: Joker session	<p>Only takes place if there are no public holidays:</p> <ul style="list-style-type: none"> - Either topics recapitulation - Or: How to use local LLMs

Students will use AI tools to generate and validate knowledge in a reliable, valid and constructively aligned manner.

Who	What	Where	
Instructor	Input: <ul style="list-style-type: none"> - Puts topic into context - Delivers the most important aspects/keywords - Connects the dots 	Public Miro Board: <ul style="list-style-type: none"> - Basic framework 	Context by experts
Student groups	AI-supported learning: <ul style="list-style-type: none"> - Each group works on the content of one aspect/keyword of the topic - Aids: anything, including GenAI - Valid sources must be provided 	Public Miro Board: <ul style="list-style-type: none"> - Fill the framework with content 	
Instructor and student groups	Discussion: <ul style="list-style-type: none"> - Each group presents findings - Comparison with instructor's private Miro Board (benchmark) - Additional inputs from other groups 	Public Miro Board: <ul style="list-style-type: none"> - Discussion 	Validation by experts and students
Student groups	Take-home task: <ul style="list-style-type: none"> - Each group updates their part of the public Miro Board - Update will be graded (because it is learning material for whole class) 	Public Miro Board: <ul style="list-style-type: none"> - Update 	Finalization by students

For the assessment, students and faculty work together to generate and validate the knowledge needed

Who	What	When
Examiners	Input for preparation: <ul style="list-style-type: none"> - Use case - Tasks (along the DVC) 	At the beginning of preparation period
Student groups	Preparation: <ul style="list-style-type: none"> - Each group reads the use case and prepares the tasks - Aids: anything, including GenAI 	Preparation period (15min)
Examiners and student groups	Examiners moderate the discussion: <ul style="list-style-type: none"> - Students work on the tasks together - Aids: anything, including GenAI - Examiners ask questions - Examiners give all the students the same amount of speaking time 	Oral exam (30min)
Examiners	Examiners discuss and grade the individual students	After the exam (15min)

This entails the same courseload and outcomes as conventional approaches, but with a different distribution of hours and approaches to learning.

Task	Calculation	Hours	Percentage
Teaching and coaching	6-7 sessions à 200min	23h	13%
Grading weekly assessments	4 assessments and 15 groups, grading à 60min per assessment	60h	34%
Final oral group exam	15 groups à 60min (exam and grading) with two examiners	30h	17%
Preparation		40h	23%
Additional coaching		10h	6%
Administration		13h	7%
		Total 176h	100%

The **Fundamentals of Data Science...**

- ▶ integrates Generative AI for both teaching and testing
- ▶ promotes Data Literacy by having students DO it rather than talk about it
- ▶ applies the recommendations of the Hochschulforum Digitalisierung

Relevant Sources

- Bashrat, S.M.; Myrzakhan, A.; Shen, Z. (2024) Principled Instructions Are All You Need for Questioning LLaMA-1/2, GPT-3.5/4 arXiv:2312.16171v2
- Bloom, B. (1984). The 2 sigma problem: The search for methods of group instruction as effective as one-to-one tutoring. Educational researcher 13.6, S. 4-16.
- Brendel, S., Hanke, U., & Macke, G. (2019). Kompetenzorientiert lehren an der Hochschule. utb GmbH.
- Buck, I., Jost, C. Kreis-Hoyer, P., Limburg, A. (2023): KI-induzierte Transformation an Hochschulen. Berlin: Hochschulforum Digitalisierung.
- Hattie, J., & Yates, G. C. (2013). Visible learning and the science of how we learn. Routledge
- Jantos, A., & Langesee, L. M. (2022). Blended Assessment in Higher Education Collaborative Case Study Work—A Qualitative Study. In International Conference on Interactive Collaborative Learning (pp. 44-56). Cham: Springer International Publishing.
- Marfurt, A. (05. 04 2023). Prüfen mit ChatGPT. Präsentation.
- Stalder, C et al (2023). Lernende gestalten entwicklungsorientierte Leistungsnachweise im Berufskundeunterricht In W. Burk, & C. Stalder, Entwicklungsorientierte Bildung in der Praxis (S. 118-134). Beltz-Juventa.
- Stellarlabs. (2023). Stellar Labs. Von <https://www.stellarlabs.io/> abgerufen
- Tu, X., Zou, J., Su, W., & Zhang, L. (2023). What Should Data Science Education Do with Large Language Models? arXiv preprint , arXiv:2307.02792.