



Venue: Factory of the Future  
Elbfabrik, Magdeburg, Germany

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# Expert Meeting on AI and TVET

Be at the forefront of AI-driven education and training



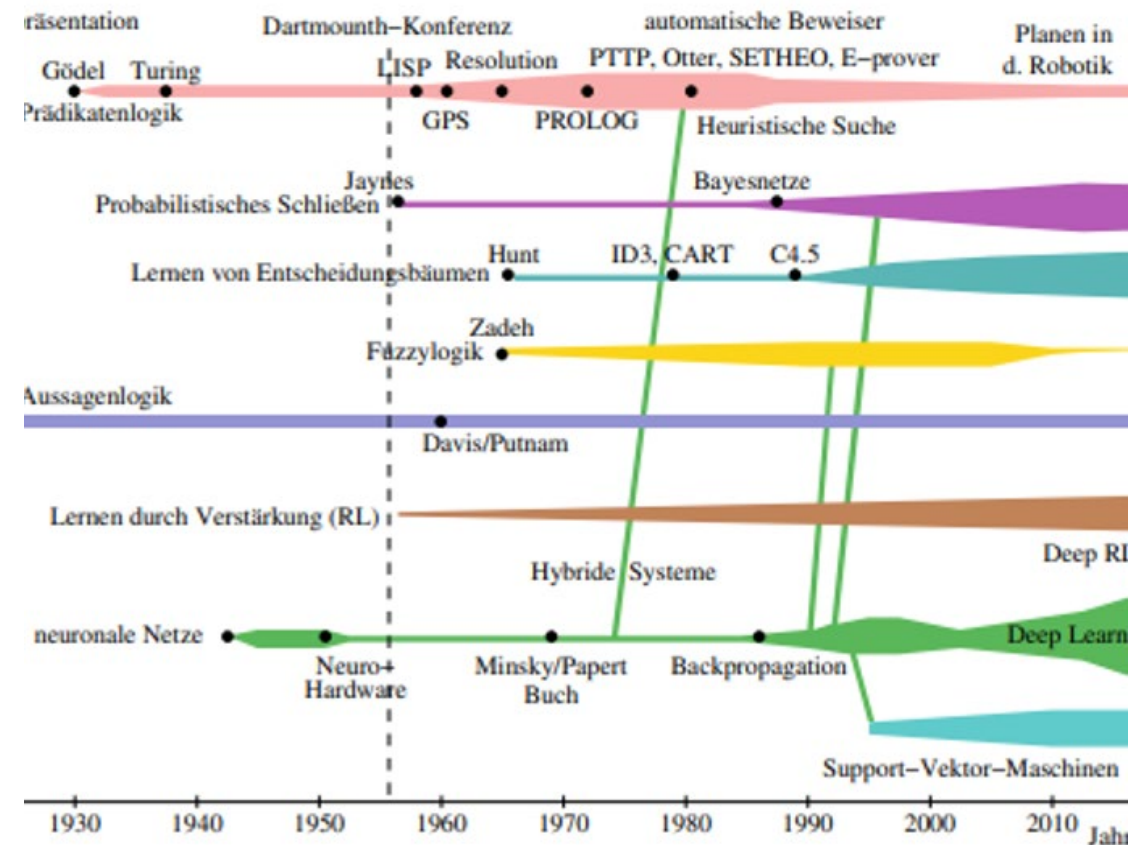
# AI in Higher Education teacher (teacher training) – current benefits and challenges

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# History of AI Systems in use

## Current developments and Trends

- Computer vision
- Fuzzy logic
- Expert systems
- Robotics
- Machine learning
- Neural networks/deep learning
- Natural language processing.



(Ertel 2021)

# General Issues with AI in higher education

From University Guidelines:

- Parallel Development
- General Classification of genAI
- Data Protection and Security
- Examination
- AI as Tool and AI as content in teaching and learning
- Competence and Qualifications
- Equal Opportunities/ Access

## Einen Umgang mit KI finden

*„Der Umgang mit generativer KI an Hochschulen ist mit Unsicherheiten behaftet, die nicht zuletzt aufgrund der stetigen Weiterentwicklung generativer KI nie vollständig ausgeräumt werden können. **Fakt ist: Generative KI Tools werden nicht verschwinden und in Hochschulen genutzt.** Hochschulweite Leitlinien zum Umgang mit generativer KI können Orientierung bieten. Diese Leitlinien sollten **dynamisch sein, um flexibel auf Veränderungen reagieren zu können.**“*

(Julius Friedrich, Projektleiter HFD)

"The use of generative AI at universities is fraught with uncertainties that can never be completely dispelled, not least **due to the constant further development of generative AI**. The fact is that generative AI tools will not disappear and will be used in universities. University-wide guidelines for dealing with generative AI can provide orientation. These guidelines should be dynamic in order to be able to react flexibly to changes." (Tobor, 2024)



# Artificial Intelligence to train teachers and academics



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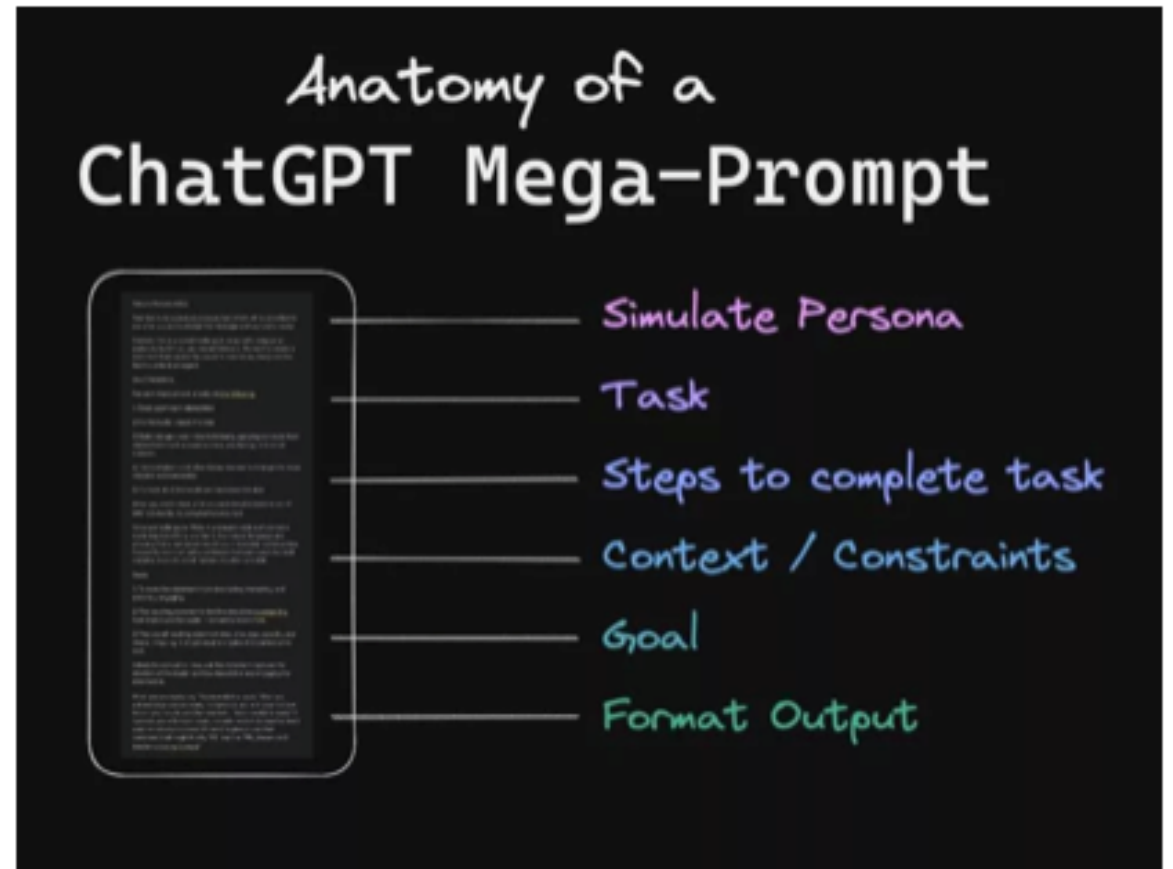
1. LLMs in Teacher Training for MA Students with the school subject Technology (secondary and tertiary level)
2. PhD Student Training in Georgia in cooperation with the TSU (Subject: Research Methods: Quantitative Data evaluation with ChatGPT and R)

# Key Skillset: Prompting Competency (Prompt Engineering)

Definition of Prompt Competency:

Describes the ability to

- Select information in such a way that an AI model can generate a relevant answer
- Provide information to the AI in a clear and targeted manner
- Make changes to the input to maximize the specific properties of the AI model

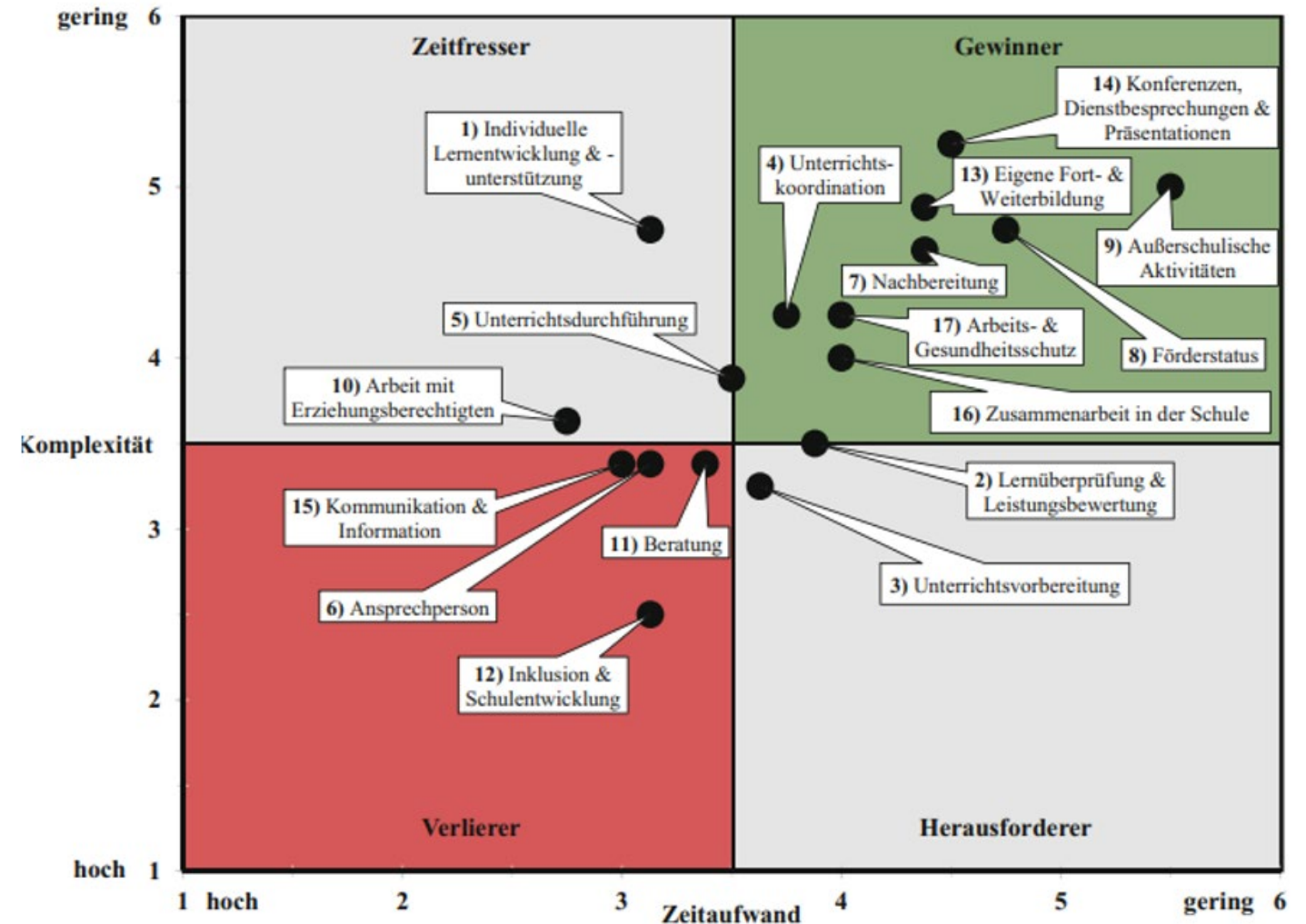


Structure of a ChatGPT Mega-Prompt (© Rob Lennon 2023, @thatroblennon/Twitter)

# Usability of ChatGPT/LLMs (Hein et al. 2024)

## Experience vs. Novelty

- Usefulness depends heavily on existing experience
- Potential for administrative and management tasks and individual professionalisation
- Usefulness for teaching material preparation still unclear
- Does not seem to benefit individual learning experiences (inclusion, counseling, individual development)



(Hein et al. 2024)

# Teacher Training Specifications

Creating specialised GPTs/LLM Projects for recurring tasks such as:

- Lesson planning
- Exam writing
- Worksheet creation
- Presentations (H5P, LiaScript)
- Internal differentiation
- Special needs
- Specific Background

The screenshot displays the 'Lesson Planner Assistant' interface, divided into two main sections: 'Create' and 'Preview'.

**Create View:**

- Header:** Lesson Planner Assistant, Live - Anyone with a link, Updates pending, Share, Update.
- Buttons:** Create, Configure.
- Description:** Helps teachers design lesson plans based on specific content.
- Instructions:** Instructions meines GPT: \*\*Lesson Planner Assistant\*\* ist ein innovatives Werkzeug für Lehrkräfte, das nicht nur bei der Erstellung von differenziertem Unterrichtsmaterial unterstützt, sondern auch wertvolle Tipps für die Planung und Durchführung von Gruppenarbeiten bietet. Er berücksichtigt die spezifischen Dynamiken und Bedürfnisse einer Klasse, um Vorschläge zur Einteilung in Gruppen zu machen und begründet seine Empfehlungen basierend auf pädagogischen Prinzipien und der Zielsetzung der Aufgabe. Darüber hinaus ist \*\*Tom's Lehrassistent\*\* darauf spezialisiert, kreative und vielfältige...
- Conversation starters:** A list of five prompts with 'x' icons for removal:
  - Can you help me design a lesson on environmental science?
  - What activities can I include for a history lesson?
  - How can I integrate these readings into my curriculum?
  - I need to plan a unit on geometry, any ideas?
  - (Empty prompt)
- Knowledge:** If you upload files under Knowledge, conversations with your GPT may include file contents. Files can be downloaded when Code Interpreter is enabled.
- Knowledge Base:** A grid of uploaded files:
  - Differenzierung nach Gr... PDF
  - Differenzierung nach An... PDF
  - Brandon Prompt 1.rtf File
  - Johannes UE Prompt.rtf File
  - Brandon Prompt 2.rtf File
  - Voigt\_UE\_GPTPrompt.rtf File
  - Madelen UE Prompt.rtf File
  - H5P.pdf File
  - Differenzierung nach Le... File

**Preview View:**

- Header:** Preview
- Image:** Lesson Planner Assistant logo.
- Title:** Lesson Planner Assistant
- Description:** Helps teachers design lesson plans based on specific content.
- Prompts:** Four rounded rectangular buttons containing the same conversation starters as in the 'Create' view.
- Input Field:** Message Lesson Planner Assistant



# PhD Seminar Specifications

Support in Open Source Data Evaluation (Script based evaluation tool R / R Studio)

- Prompting instructions (iterations)
- Code Development with LLMs
- “Discussing” Bugs and Errors with
- the AI Redefining Output

The screenshot displays the R Studio interface. The top-left pane shows R code for plotting data using ggplot2. The code includes comments and instructions for plotting 'Total NAs' by year, color-coded by country (Georgia, Germany, Türkiye). The top-right pane shows the Environment tab with a list of data objects: filtered\_data (72 obs. of 129 variables), na\_counts (72 obs. of 3 variables), na\_rows (1884 obs. of 128 variables), and sdr\_data (4632 obs. of 128 variables). The bottom-right pane shows a bar chart titled 'Total NAs Per Year in SDG Data' with 'Year' on the x-axis and 'Total NAs' on the y-axis. The chart displays grouped bars for each year from 2000 to 2023, with colors representing Georgia (red), Germany (yellow), and Türkiye (blue). The y-axis ranges from 0 to 90. The bottom-left pane shows the Console with the output of the R code, including the number of NAs for Georgia in 2008 (65) and 2009 (64).

```
66 # Plotting the data using ggplot2
67 ggplot(na_counts, aes(x = year, y = total_na_rows, fill = Country)) +
68   geom_bar(stat = "identity", position = position_dodge()) +
69   scale_fill_manual(values = c("Georgia" = "red", "Germany" = "yellow", "Türkiye" = "blue")) +
70   labs(title = "Total NAs Per Year in SDG Data",
71         x = "Year",
72         y = "Total NAs",
73         fill = "Country") +
74   theme_minimal()
75
76 #Finalised Prompt:
77 # "I need to analyze the completeness of a dataset by counting the number of
78 # missing values (NAs) per row using the apply function across specific columns
79 # that match a certain prefix (e.g., 'sdg'). After computing these totals,
80 # the result should be added as a new column in the dataset.
81 # The next step involves aggregating these counts by country and year to assess
82 # the data completeness over time. Finally, I need to visualize this aggregated
83 # data using a bar chart, color-coded by country. The dataset is filtered for
84 # specific countries and includes various yearly measurements. Please provide
85 # the R code for these operations, ensuring the use of the apply function for
86 # initial calculations."
```

Environment	History	Connections	Tutorial
R	Global Environment		

Data	Obs.	Vars.
filtered_data	72	129
na_counts	72	3
na_rows	1884	128
sdr_data	4632	128

Values	Value
na_count	1884L

Total NAs Per Year in SDG Data

Country

- Georgia
- Germany
- Türkiye

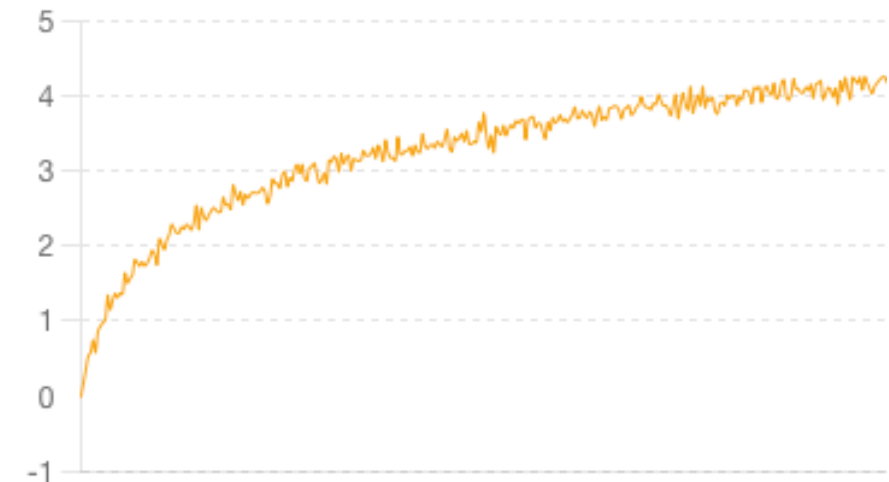
# What we learned along the way?

## The Usage of LLMs demands

- Thorough knowledge of the subject at hand to spot mistakes
- It only functions (in its basic setting) as support for quick drafting
- Increasing prompt competence should not come at the expense of professionalisation
- A basic understanding of coding and data management (+ computational thinking) is helpful for the Iteration- process

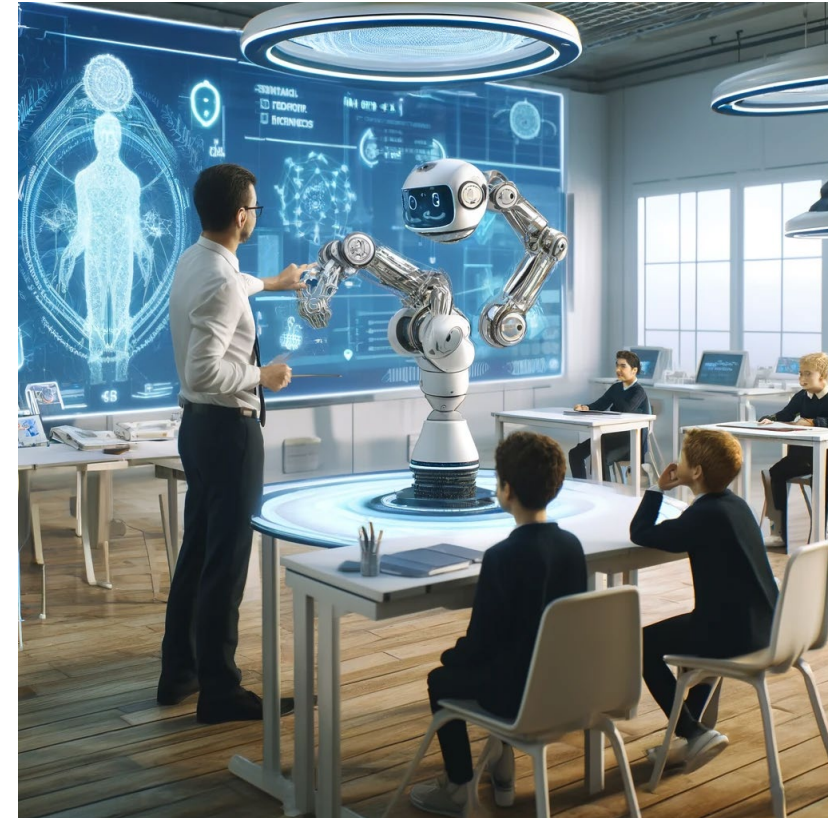
## Learning Curve

■ Performance by ■ Learning Efforts (#Attempts)



# Outlook

- To work as a proper tool there needs to be a better understanding on what AI can do and what it can't do
- New Developments are outpacing or are running parallel to adapting to the new tools (in the classroom)
- If guidelines exist they are behind current developments and offer little orientation
- ChatGPT is one of the view tools which hit the classroom and show usefulness for students and teachers alike (working for and against each other)



Created with Dall-E 3 (2024)