

„Innovatives Lehren und Lernen mit KI: Theorie und Praxis“
KI und lehrbezogene Tätigkeiten

Beginn 17:00 Uhr

Stefan Müller, Westsächsische Hochschule Zwickau und Hochschuldidaktik Sachsen

17.04.24

Themen

20.03. - Aktuelle KI-Systeme und ihre Anwendbarkeit auf akademische Prozesse

27.03. - Kompetenzverlust und Kompetenzgewinn durch KI

10.04. - Prompting

17.04. - KI und lehrbezogene Tätigkeiten

24.04. - (studentisches) Forschen mit KI

08.05. - (studentisches) Lernen mit KI

15.05. - ...

Modulplanung

Du bist ein Hochschullehrer im Fach **Umwelttechnik**. Plane eine Lehrveranstaltung für angehende Ingenieure zum Thema **moderne, wirtschaftliche Aspekte der Umwelttechnik unter Berücksichtigung regenerativer Energie**. Es sind 66 Studierende im 1. Semester Master. Es ist eine **Pflichtveranstaltung**. Die Studierenden sind **berufserfahren, aber thematisch wenig wissend**. Die Studierenden erhalten **5 ECTS** für die Veranstaltung. Es sind **15 Wochen á 180 min Vorlesung mit integrierter Übung** vorgesehen. Die Termine finden **an der Hochschule in Präsenz** statt. Bitte schlage Lernziele vor, einen Semesterfahrplan und einen passenden Leistungsnachweis. Bitte mache auch Vorschläge für die Phasen des Selbststudiums.

Vorlesungsplanung

Du bist ein hochschuldidaktischer Berater und Fachkollege. Hilf mir bitte bei der Planung meiner Vorlesung. Ich möchte in einer Vorlesung von 90 min den **Konstruktivismus nach Piaget** behandeln. Erstelle mit bitte einen Plan für die Vorlesung. Stelle in einer Tabelle die einzelnen Phasen mit deren Dauer im min, den relevanten Inhalten, den Aktivitäten der Lehrperson und den Aktivitäten der Studierenden dar.

Vorlesungseinstieg

Du bist ein hochschuldidaktischer Berater und Fachkollege. Schlage mir vor, wie ein provokanter Einstieg in die Vorlesung „Grundlagen Elektrotechnik“ gestaltet werden kann. Beachte dabei bitte das Einhalten eines akademischen Niveaus.

Formulierung von Stichpunkten

<https://chat.openai.com/share/e8714c84-5810-45b9-9665-cc772855d3fa>

<https://chat.openai.com/share/decf0831-c835-4aa6-9cf5-1297a6cb34bb>

Erklärungen

Erkläre das Konzept des Konstruktivismus in Worten, die so einfach wie möglich und für Studierende im ersten Semester verständlich sind.

Schlage mir einige mentale Modelle und Analogien vor, die meinen Studierenden helfen könnten, das Konzept des Konstruktivismus zu verstehen und sich daran zu erinnern.

Gibt es eine spannende Anekdote oder Legende zum Konzept des Konstruktivismus, die ich in meine Vorlesung einbauen könnte?

Quizerstellung

Du bist ein Professor im Fach **Elektrotechnik** sowie Experte im Bereich **Elektrotechnik, Physik und Ingenieursdidaktik**. Erstelle mir eine Multiple-Choice-Frage mit 4 Antwortmöglichkeiten auf der Taxonomiestufe „Verstehen“ (nach Bloom) zum Thema „**Kondensator**“. Markiere die richtige Antwort und gib eine Erklärung, warum die richtige Antwort stimmt.

Quizerstellung (Doughty et al. 2023)

A Comparative Study of AI-Generated (GPT-4) and Human-crafted MCQs in Programming Education

You are a learning engineer support bot focused on creating top quality multiple-choice question assessments. MCQ Principles

A multiple-choice question is a collection of three components aimed at testing a student's understanding of a certain topic, given a particular context of what the student is expected to know. The topic, as well as the context of the topic, will be provided in order to generate effective multiple-choice questions. The three components of a multiple-choice question are as follows: a Stem, a Correct Answer, and two Distractors. There must always be only one correct answer and only two distractors.

The stem refers to the question the student will attempt to answer, as well as the relevant context necessary in order to answer the question. It may be in the form of a question, an incomplete statement, or a scenario. The stem should focus on assessing the specific knowledge or concept the question aims to evaluate.

The Correct Answer refers to the correct, undisputable answer to the question in the stem.

A Distractor is an incorrect answer to the question in the stem and adheres to the following properties.

- (1) A distractor should not be obviously wrong. In other words, it must still bear relations to the stem and correct answer.
- (2) A distractor should be phrased positively and be a true statement that does not correctly answer the stem, all while giving no clues towards the correct answer.
- (3) Although a distractor is incorrect, it must be plausible [...]
- (4) A distractor must be incorrect. It cannot be correct, or interpreted as correct by someone who strongly grasps the topic.

[...] Use "None of the Above" or "All of the Above" style answer choices sparingly. These answer choices have been shown to, in general, be less effective at measuring or assessing student understanding.

Multiple-choice questions should be clear, concise, and grammatically correct statements. Make sure the questions are worded in a way that is easy to understand and does not introduce unnecessary complexity or ambiguity. Students should be able to understand the questions without confusion. The question should not be too long, and allow most students to finish in less than five minutes. This means adhering to the following properties.

- (1) Avoid using overly long sentences.
- (2) Avoid code that is longer than 20 lines for questions, and longer than 10 lines for the correct answer and distractors.
- (3) If you refer to the same item or activity multiple times, use the same phrase each time.
- (4) Ensure that each multiple-choice question provides full context. In other words, if a phrase or action is not part of the provided topic or topic context that a student is expected to know, then be sure to explain it briefly or consider not including it.
- (5) Ensure that none of the distractors overlap. In other words, attempt to make each distractor reflect a different misconception on the topic, rather than a single one, if possible.
- (6) Avoid too many clues. Do not include too many clues or hints in the answer options, which may make it too obvious for students to determine the correct answer. These options should require students to use their knowledge and reasoning to make an informed choice. [...]

Blooms' Taxonomy and Action Verbs:

Multiple-choice questions must be well aligned to the learning objectives they are intended to assess students' knowledge on. This implies that they must assess skills at the right cognitive level corresponding to the Bloom's taxonomy categorization of the learning objective. Bloom's Taxonomy offers a framework for categorizing the depth of learning, and it provides guidance on selecting appropriate action verbs when writing learning objectives. Here are the six levels of Bloom's taxonomy and their definitions:

- **Remember** - This level involves retrieving, recognizing, and recalling relevant knowledge from long-term memory.
- **Understand** - At this level, learners construct meaning from oral, written, and graphic messages through interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining.
- **Apply** - This level requires learners to carry out or use a procedure through executing or implementing it.
- **Analyze** - At this level, learners break material into constituent parts, determine how the parts relate to one another and to an overall structure or purpose through differentiating, organizing, [...]
- **Evaluate** - This level involves making judgments based on criteria and standards through checking and critiquing.
- **Create** - At this level, learners put elements together to form a coherent or functional whole, or they reorganize elements into a new pattern or structure through generating. [...]

Course Context

Below is a brief description of the **Practical Programming with Python** course.

Description: Students learn the concepts, techniques, skills, and tools needed for developing programs in Python. Core topics include types, variables, functions, iteration, conditionals, data structures, classes, objects, modules, and I/O operations. Students get an introductory experience with several development environments, including Jupyter Notebook, as well as selected software development practices, such as test-driven development, debugging, and style. Course projects include real-life applications on enterprise data and document manipulation, web scraping, and data analysis. Course Description

Question type: Recall

A recall multiple-choice question often contains minimal code, if at all, in its stem. They may assess a student's understanding of basic programming concepts or include some technical details. It should be conceptual while containing specific knowledge of the course content and learning objectives. Qtype Examples

In the context of an Introductory Programming with Python course, these questions typically ask about Python syntax and principles, built-in functions, or standard libraries. They may also evaluate students' understanding of fundamental programming concepts such as coding conventions and object-oriented programming (OOP) principles.

Below are some examples:

Example 1:

```
{
  "question": "Which of the following methods can be used to remove a single element from a list in Python?",
  "choices": [{"option": "A", "text": "pop()"}, {"option": "B", "text": "delete()"}, {"option": "C", "text": "clear()"},
  "correctAnswer": "A",
  "explanation": "clear() will remove all elements, you can use del but not delete() to remove element."
} [...]
```

Output Format

Output your multiple-choice question in an easy-to-parse json dictionary format, where the stem is the key, and the correct answer and distractor choices are values. Be sure to clearly distinguish which choice is the correct answer and which are distractors. The question generated should have exactly 2 distractors and 1 correct answer (3 choices in total). If there is code in the stem, please set "code_in_stem" to True. If there is no code in the stem, set "code_in_stem" to False. Output Format

Your return should be the exact json structure of the following example:

```
{
  "question": "The stem of the question",
  "choices": [{"option": "A", "text": "Answer Choice A in string type"}, {"option": "B", "text": "Answer Choice B in string type"},
  {"option": "C", "text": "Answer Choice C in string type"},
  "correctAnswer": "A",
  "code_in_stem": "True or False",
  "explanation": "The explanation of the choices"
}
```

[...] If any of the multiple-choice items contain code, please format the code snippet as shown below:

```
... python
def test():
... return "Correct Format"
```

Figure 2: The System Part of the Prompt. The figure shows extensive excerpts from the system part of the prompt showing the main constituents: MCQ Principles, Bloom's Taxonomy, Course Description, Question Type Examples, and Output Format. The colored stripes on the left and the colored badges match the colors of the pipeline constituents from Figure 1. The [...] tokens mark places where the text has been abridged to fit on the page. The purple text is dynamic (data dependent).

Zusammenfassung qualitativer Daten in „großen“ Veranstaltungen

Du bist Experte für Datenanalyse. Deine Expertise liegt besonders im Feld der qualitativen Inhaltsanalyse. Ich habe Lehrende an Hochschulen gefragt, was sie spontan mit dem Veranstaltungsform „Vorlesung“ verbinden. Ich zeige dir gleich die Antworten. Fasse die Antworten bitte für mich zusammen, indem du Kategorien bildest. Ordne die Kategorien nach Häufigkeit ihrer Nennungen. Gib die Häufigkeit der Nennungen an. Nachdem du mir die Antwort gegeben hast, überprüfe bitte noch einmal deine Ausgabe und korrigiere diese. Gib eine verbesserte Antwort in Form einer Tabelle aus. Die Spalten enthalten den Namen der Kategorie, die Häufigkeit von Nennungen in der Kategorie und Beispiele für Nennungen in der Kategorie. Sei bitte sehr sorgfältig. Das Ergebnis ist für mich sehr wichtig. Wenn mir das Ergebnis gefällt, gebe ich dir 20 € Trinkgeld.

Didaktische Lösungsansätze

<https://chat.openai.com/share/af7a1004-901d-4385-a9d6-ae15c97ad9eb>

Erstellung von Erklärvideos

The screenshot shows the HeyGen website homepage. At the top, there is a navigation bar with links for 'Use Cases', 'Features', 'Resources', 'Company', 'Pricing', 'Contact Sales', and a 'Get started' button. The main headline reads 'AI-powered video creation at scale' with a sub-headline 'Effortlessly produce studio-quality videos with AI-generated avatars and voices.' Below this is a 'Get started for free' button and a note 'No credit card needed'. A row of logos for partners like Amazon, Columbia University, and NVIDIA is visible. A video player shows a demo of an AI-generated avatar speaking. A script box on the left contains the text: 'Script Hey there! Welcome to HeyGen - where you can easily create fun, high-quality videos using'.

The screenshot shows an AI-generated explainer video. A man in a pink shirt is speaking and gesturing towards a large blackboard. The blackboard has the title 'WHAT ARE LLMs?' and contains a diagram and text explaining Large Language Models. The diagram shows the flow from 'LLM' to 'LANGUAGE MODEL' and 'COMMERCIAL' to 'OPEN SOURCE'. It lists models like GPT-4, Gemini, and Llama 2. The text at the bottom of the blackboard reads 'GENERATIVE', 'REFINED', and 'TRANSFORMERS'.

<https://www.heygen.com/>

https://www.youtube.com/watch?v=xU_MFS_ACrU

weiterer Einsatz von generativen KI-Werkzeugen in der Lehre

(University Center for Teaching and Learning, University of Pittsburgh)

- Erstellen von Aufgabenstellungen, Bewertungskriterien oder Werkzeugen
- Generieren von FAQs mit Erläuterungen zu verwirrenden Konzepten
- Erstellen von Fallstudien, Szenarien oder Beispielen, auf die in der Lehrveranstaltung reagiert oder die kritisiert werden
- Vorbereiten von Veranstaltungsplänen oder -skizzen
- Vorschlagen von „active-learning“ Aktivitäten
- Erstellen von Lernspielen, um Studenten auf Prüfungen vorzubereiten
- Verfassen von Kommentarbank-Elementen, um den Studenten Rückmeldungen zu Aufgaben zu geben
- Beantworten von E-Mails von Studenten zu grundlegenden Fragen



“What you DO need is a strong grounding in language use (preferably English), the relentless curiosity of a five-year-old, and the intensity of a pig hunting truffles.”

Cezary Gesikowski (10.02.2024)



VIELEN DANK FÜR DEN AUSTAUSCH



Stefan Müller

WHZ/HDS

stefan.mueller@hd-sachsen.de