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# **Interactive Prompting School: Concept Creation and Prototype Development of a Web-Based Learning Platform**

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# Abstract

In an era where language-based AI tools such as ChatGPT, Gemini, and Claude are becoming widely adopted across education, business, and creative industries, the ability to communicate effectively with these systems is increasingly essential. This thesis presents the design, development, and evaluation of Prompting School, an interactive web-based learning platform created to improve users' prompt engineering skills through hands-on experimentation and structured lessons.

The course content is built around four core strategies from OpenAI's Prompt Engineering Guide: writing clear instructions, providing reference text, breaking down complex tasks, and giving the model time to "think". The platform integrates a Svelte frontend, a Python (Flask) backend, and OpenAI's API to deliver real-time AI feedback, track user progress, and evaluate summaries and quizzes. A key feature is the Prompt Laboratory, which lets users test prompt variations in realistic scenarios and receive instant feedback.

The research follows a Design Science Research (DSR) approach and includes a proof-of-concept evaluation with 19 participants. Results suggest that Prompting School is effective in boosting prompt literacy, encouraging active engagement, and making AI more accessible. While not aiming to teach programming or AI theory, the platform focuses on practical skill-building, aligned with some elements of UNESCO's AI competency framework for students. This thesis contributes to the growing field of AI literacy by offering a scalable, learner-centered model for teaching prompt engineering.

In a subsequent iteration, the platform was changed and evaluated through a workshop with 21 in-service teachers, whose feedback informed the second version and confirmed alignment with UNESCO's AI Competency Framework.



# Kurzfassung

In einer Zeit, in der sprachbasierte KI-Werkzeuge wie ChatGPT, Gemini und Claude zunehmend in Bildung, Wirtschaft und kreativen Branchen eingesetzt werden, wird die Fähigkeit, effektiv mit diesen Systemen zu kommunizieren, immer wichtiger. Diese Masterarbeit stellt die Konzeption, Entwicklung und Evaluation von Prompting School vor - einer interaktiven, webbasierten Lernplattform, die darauf abzielt, die Prompt-Engineering-Kompetenz der Nutzer:innen durch praktische Übungen und strukturierte Lerneinheiten zu verbessern.

Die Kursinhalte basieren auf vier zentralen Strategien aus OpenAI's Prompt Engineering Guide: klare Anweisungen schreiben, Referenztexte bereitstellen, komplexe Aufgaben in Teilaufgaben zerlegen und dem Modell Zeit zum "Nachdenken" geben. Die Plattform kombiniert ein Svelte-Frontend mit einem Python-(Flask)-Backend sowie der OpenAI-API, um KI-gestütztes Echtzeitfeedback zu ermöglichen, den Lernfortschritt zu erfassen und Zusammenfassungen sowie Quizze automatisch zu bewerten. Ein zentrales Element ist das Prompt-Labor, in dem Nutzer:innen verschiedene Prompt-Varianten in realistischen Szenarien testen und direktes Feedback erhalten können.

Die Forschung folgt einem Design-Science-Research-(DSR)-Ansatz und beinhaltet eine Proof-of-Concept-Evaluation mit 19 Teilnehmenden. Die Ergebnisse deuten darauf hin, dass die Prompting School die Prompt-Kompetenz effektiv stärkt, aktives Lernen fördert und KI für eine breitere Zielgruppe zugänglicher macht. Auch wenn keine Programmier- oder KI-Theorie vermittelt wird, liegt der Fokus auf praxisorientiertem Kompetenzaufbau - in Anlehnung an zentrale Aspekte des UNESCO-Kompetenzrahmens für KI für Lernende. Die Arbeit leistet damit einen Beitrag zur Förderung von KI-Kompetenz durch ein skalierbares, lernendenzentriertes Modell zum Erlernen von Prompt Engineering.

In einer weiteren Iteration wurde die Plattform überarbeitet und im Rahmen eines Workshops mit 21 Lehrkräften evaluiert. Das erhaltene Feedback floss in die zweite Version ein und bestätigte die verbesserte Übereinstimmung mit dem KI-Kompetenzrahmen der UNESCO.



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# List of Acronyms and Symbols

<b>AI</b>	Artificial Intelligence
<b>API</b>	Application Programming Interface
<b>CDN</b>	Content Delivery Network
<b>CSS</b>	Cascading Style Sheets
<b>DSR</b>	Design Science Research
<b>Flask</b>	A Python web framework
<b>GPT</b>	Generative Pre-trained Transformer
<b>HCI</b>	Human-Computer Interaction
<b>HTML</b>	HyperText Markup Language
<b>JWT</b>	JSON Web Token
<b>LLM</b>	Large Language Model
<b>NLP</b>	Natural Language Processing
<b>PostgreSQL</b>	An open-source relational database system
<b>REST</b>	Representational State Transfer
<b>SQL</b>	Structured Query Language
<b>Svelte</b>	A JavaScript framework
<b>UI</b>	User Interface
<b>UX</b>	User Experience



# 1. Introduction

## 1.1. Problem Statement and Motivation

A comprehensive understanding of every aspect of artificial intelligence (AI) is not required to engage with AI systems effectively; rather, it is essential to understand how to formulate appropriate queries and where to seek reliable assistance. While it is not always possible to identify the ideal source of information, large language models (LLMs) such as ChatGPT offer a widely accessible interface for interaction with AI. This thesis, alongside the associated course and web platform, supports learners at various levels—from those beginning their exploration of AI tools to those with prior experience—by enhancing their ability to interact effectively with language-based generative AI tools.

The primary focus of this work is on the development of skills related to the use of LLMs, with a particular emphasis on OpenAI’s ChatGPT. Other tools such as Google Gemini, Claude, and Microsoft Copilot are also addressed as examples of relevant technologies in this domain. Interaction with a language model begins with a message, known as a prompt. As defined by the Cambridge Dictionary, a prompt is “an instruction given to an artificial intelligence [...] by a human using natural language rather than computer language” [1]. OpenAI defines prompt engineering as “the process of crafting prompts to get the right output from a model.” These definitions are adopted as the working definitions of prompt and prompt engineering throughout this thesis.

Crafting an effective prompt is a critical factor in obtaining high-quality responses from an LLM. The more precise and thoughtfully constructed the prompt, the higher the likelihood of receiving a relevant and useful output. This thesis aims to support the development of prompt engineering skills through a structured educational approach, drawing on four core strategies outlined in OpenAI’s Prompt Engineering Guide.

Language-based AI tools are increasingly integrated into a wide range of fields, including education, business, industry, and creative sectors. Tools such as ChatGPT, Gemini, Claude, and Copilot are routinely employed for tasks including content generation, customer support, research assistance, and software development.

To address the growing demand for AI literacy and to facilitate the responsible and effective use of LLMs, this thesis presents Prompting School, an interactive, web-based educational platform. The platform is designed to teach best practices in AI prompting and guide users in the development of effective interaction techniques with AI systems. Through this initiative, the thesis contributes to broader efforts in promoting the competent and reflective use of generative AI technologies.

## 1.2. Research Goal and Objectives

The primary goal of this research is to design, develop, and evaluate an interactive educational platform that improves users' ability to craft effective AI prompts. This research explores technical aspects of AI prompt engineering education and tries to align the course content and structure to fit UNESCO's AI competency framework for students [26].

To achieve this goal, the following objectives are defined:

- To design and develop an interactive learning platform for AI prompt engineering.
- To evaluate user engagement, learning effectiveness, and areas for improvement based on empirical feedback.

## 1.3. Research Questions

This thesis seeks to answer the following research question:

- **RQ1:** How can an interactive web-based platform support the development of prompting competences for effective use of large language models?

## 1.4. Scope of the Research

This research focuses on the conceptualization, implementation, and evaluation of the Prompting School platform as an educational tool for AI prompting. Specifically, it covers:

- The pedagogical framework and instructional design of Prompting School.
- The technical implementation of the platform, including frontend, backend, and AI integration.
- A user study assessing the effectiveness of structured AI prompting education.

This study does not aim to develop new AI models or algorithms. Instead, it focuses on enhancing user interaction with existing AI technologies through structured learning. The evaluation includes both students and teachers, as both are well-positioned to assess the platform's suitability for educational settings.

## 1.5. Methodology Overview

This research follows a Design Science Research (DSR) approach [10], which emphasizes the iterative development and evaluation of technological artifacts. The study is structured into two main phases, with a redesign iteration based on initial feedback:

- **Platform Development:** The initial design and technical implementation of Prompting School, incorporating AI-driven exercises, structured lessons, and real-time feedback mechanisms. This phase also includes the redesign and enhancement of the platform based on insights from the first round of user evaluation.
- **User Evaluation:** A two-stage evaluation process. The first stage involved an online study to assess usability, learning effectiveness, and engagement among early users. Based on this feedback, the platform was revised and improved. In the second stage, a redesigned version of the platform was evaluated in a workshop setting with in-service teachers, offering further insights into the educational suitability of the tool and its alignment with the UNESCO AI Competency Framework for students.

The evaluation process combines both quantitative and qualitative data, providing a comprehensive understanding of user learning experiences, strengths of the platform, and areas for improvement. The findings of both evaluation phases are presented in Chapters 5 and 6.

## 1.6. Thesis Structure

This thesis is structured into seven chapters, guiding the reader from the problem context and theoretical foundation to the practical development and evaluation of the Prompting School platform:

- **Chapter 1: Introduction**  
This chapter outlines the motivation behind the project, the research objectives, guiding question, scope, and the methodology used. It also introduces the concept of prompt engineering and sets the stage for the thesis.
- **Chapter 2: Theoretical Background**  
This chapter provides the foundation for understanding the relevance of prompt engineering and AI literacy. It introduces key concepts from the fields of digital literacy, generative AI, and education, including a review of existing learning platforms and frameworks such as UNESCO's AI competency framework. It also presents the structure and content of the Prompting School course.
- **Chapter 3: Methodology**  
This chapter describes the research design and methodological approach. A Design Science Research (DSR) framework is used to guide the development and evaluation of the platform. It also outlines the data collection process and details of the user study.
- **Chapter 4: Software Architecture and Implementation**  
This chapter presents the technical realization of the Prompting School platform.

It covers the frontend and backend implementation, the integration with OpenAI's API, database design, system architecture, and key features of the learning experience.

- **Chapter 5: Findings and Proof-of-Concept**

This chapter reports the results of the user evaluation. It presents user feedback on the platform's usability, learning impact, and areas for improvement. The chapter also discusses how the findings validate the concept and highlight the potential of prompt-based learning.

- **Chapter 6: Prompting School Version 2 and Teacher Workshop Evaluation** presents the changes made in Version 2 of the platform and discusses the findings of a teacher workshop conducted with 21 in-service educators.

- **Chapter 7: Discussion**

This chapter reflects on the findings, their implications, and how they connect to the theoretical background. It also discusses the strengths and limitations of the work, lessons learned during development, and outlines directions for future work and platform improvements.

- **Chapter 8: Conclusion**

This final chapter summarizes the main contributions of the thesis and the Prompting School platform. It reflects on the broader relevance of prompt engineering in digital education and emphasizes the importance of hands-on, interactive AI literacy tools.



## 2. Theoretical Background

This chapter provides a theoretical foundation necessary for understanding the significance and context of the "Prompting School" concept. The first section introduces Generative AI and the emerging field of prompt engineering. The second section reviews related research and existing educational platforms. The third section reviews UNESCO's AI competency framework for students and how Prompting School aligns with it, i.e. what is covered by Prompting School and what not. The fourth section covers Prompting School's course structure and content.

Artificial Intelligence (AI) refers to the development of computer systems that can perform tasks that typically require human intelligence to perform. Those tasks can be reasoning, learning, classifying, and language understanding, among others [24]. Generative AI refers to a class of machine learning models designed to create new content, such as text, images, music, and even code [3]. Unlike traditional AI systems that primarily classify or analyze data, generative AI models generate novel outputs based on learned patterns [9]. The history of generative AI starts with early rule-based systems and statistical models such as Markov chains and n-gram models, which could generate basic text but lacked contextual understanding [2, 14]. These were eventually replaced by neural networks, particularly Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTM) models, which improved sequence modeling [11]. Introduction of the Transformer architecture marked a turning point, enabling generative models to process and produce language at an entirely new scale and complexity [28]. The most advanced models today are based on deep learning architectures, particularly neural networks such as transformers [4]. As shown in Figure 2.1, the conceptual hierarchy of artificial intelligence illustrates the relationship between machine learning, deep learning, and generative AI.

The emergence of generative AI has been driven by advancements in deep learning, particularly in Natural Language Processing (NLP). More sophisticated models emerged and Transformer-based architectures were developed such as OpenAI's GPT (Generative Pre-trained Transformer) series. These models leverage self-attention mechanisms and massive datasets to generate human-like text, making them valuable tools for a wide range of applications, including content generation, code completion, and conversational AI [4].

As mentioned, one of the key breakthroughs in generative AI is the Transformer architecture, introduced, to the best of my knowledge, in the paper "Attention Is All You Need" by Vaswani et al. [28]. Unlike previous recurrent models, Transformers rely on self-attention mechanisms, allowing them to process entire sequences in parallel rather than sequentially. This innovation drastically improved efficiency and scalability, enabling models to handle much larger datasets and generate more coherent and

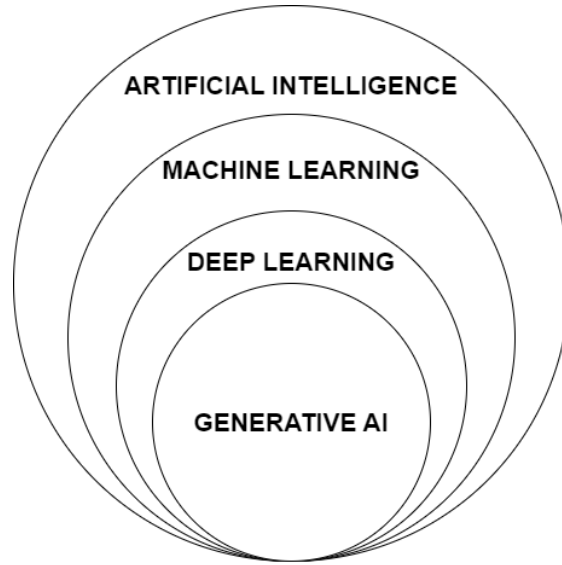


Figure 2.1.: Conceptual hierarchy of Artificial Intelligence. The diagram illustrates the nested relationship between key subfields: *Machine Learning* is a subset of *Artificial Intelligence*, *Deep Learning* is a subset of *Machine Learning*, and *Generative AI* is a specific area within *Deep Learning*.

contextually accurate responses.

Generative AI is not limited to text and images. Audio and video generation models such as Jukebox (music generation) and Runway (video synthesis) are also increasing AI creativity [7, 16]. These advancements highlight the growing influence of generative AI across multiple domains, from entertainment and design to research and software development.

In addition to OpenAI’s GPT series, several other generative AI models are worth mentioning:

- **BERT** (Bidirectional Encoder Representations from Transformers): While primarily designed for understanding rather than generation, BERT paved the way for improved contextual understanding in NLP tasks [6].
- **DALL-E**: A model designed for generating images from text descriptions, showcasing the multimodal capabilities of generative AI [19].
- **Stable Diffusion and Midjourney**: Advanced image-generation models that produce high-quality visuals from textual prompts [15, 23].
- **Gemini and Claude**: AI models developed by Google DeepMind and Anthropic, respectively, competing in the domain of text-based generative AI [1, 5].
- **Github Copilot**: A code completion and automatic programming tool developed by GitHub and OpenAI [8].

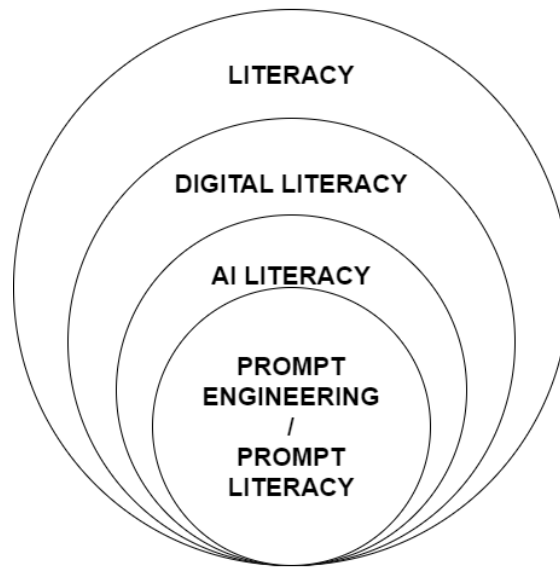


Figure 2.2.: Hierarchical relationship between different forms of literacy. Prompt engineering, or prompt literacy, is situated as a specialized subdomain within AI literacy, which itself is nested within digital literacy, and ultimately general literacy. This visual illustrates how mastering prompt engineering builds upon broader literacy domains that are essential in the digital age.

A growing area of interest in generative AI research is its application in education and human-computer interaction. AI-driven tutoring systems, automatic content generation for personalized learning, and interactive AI assistants are changing how people learn and engage with digital content [brunner12025synergy]. In this context, the ability to control and guide generative models effectively through well-crafted prompts is becoming a crucial skill.

## 2.1. From Digital Literacy to Prompt Literacy

As AI technologies become more integrated into daily life, the concept of literacy has expanded beyond traditional reading and writing skills. In the digital age, individuals must not only use technology but understand and critically engage with it. This includes digital literacy, AI literacy, and, more recently, prompt literacy-the ability to effectively communicate with AI systems using natural language prompts. The following diagram situates prompt engineering within this broader hierarchy of literacies.

### 2.1.1. Role of Prompt Engineering

Prompt engineering is the practice of crafting effective input prompts to guide generative AI models in producing desired outputs. Since generative AI models respond to textual

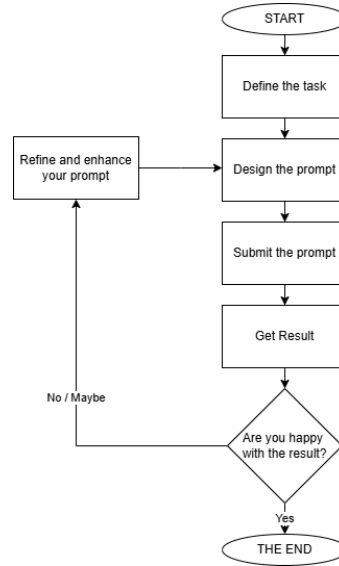


Figure 2.3.: Prompt engineering workflow depicting iterative refinement process

input, the phrasing, structure, and specificity of prompts can significantly impact the quality of the generated content [21].

Prompt engineering is a newly emerging digital skill, particularly relevant with the rise of large language models (LLMs) such as GPT-4. The Prompting School course draws directly on the practical strategies outlined by OpenAI in their guide to effective prompting [21].

Prompt engineering is increasingly seen not just as a technical tactic but as a teachable skill with design implications. For example, Zamfirescu-Pereira et al. [30] offer design guidelines for prompt engineering with LLMs, emphasizing clarity, specificity, and iteration.

A visual representation of a typical prompt engineering workflow is shown in Figure 2.3.

Prompt engineering has become important as AI systems become more widely used in professional and educational settings. Effective prompts can improve AI’s performance in answering questions, summarizing texts, generating creative content, and even reasoning through complex problems. On the other hand, poorly structured prompts can lead to ambiguous, irrelevant, or inaccurate responses.

In designing the Prompting School platform, it was important to ground the concept in relevant academic literature and theoretical frameworks related to AI literacy, digital education, and emerging competencies in the age of generative AI. This section presents an overview of related work across five thematic areas: AI literacy and competency frameworks, prompt engineering as an emerging skill, existing AI learning platforms, digital literacy and 21st-century skills, and the role of ethical and human-centred AI interaction.

### **2.1.2. AI Literacy and Competency Frameworks**

AI literacy is increasingly recognized as a foundational competency for the 21st century. It encompasses the ability to understand, use, and critically reflect on AI systems. [22] define AI literacy in education as involving not only technical knowledge, but also critical awareness and ethical reasoning.

One of the most comprehensive frameworks to date is the UNESCO AI Competency Framework for Students [26]. It structures AI literacy into four aspects: Human-centred mindset, Ethics of AI, AI Techniques and Applications, and AI System Design.

### **2.1.3. AI Education Platforms and Learning Tools**

Before introducing the "Prompting School" in greater detail, it is necessary to review relevant and current learning platforms. This section examines platforms providing educational content about prompting generative AI. Understanding the current landscape is important before designing Prompting School.

Several AI learning courses or platforms have emerged to support AI literacy, though most differ from Prompting School in structure, purpose or pedagogical focus. Several AI learning courses or platforms have emerged to support AI literacy. Using the keywords "prompt engineering course", the following platforms were inspected and analyzed with regard to their focus areas and key features:

Compared to these platforms, Prompting School focuses specifically on prompt engineering as a hands-on and immediately practical entry point into generative AI. Rather than focusing on coding or mathematical foundations, it empowers users to interact effectively with AI tools by applying structured prompting strategies, all within a self-paced learning framework.

### **2.1.4. Digital Literacy and 21st Century Competencies**

The theoretical foundation for Prompting School also draws from broader discourses on digital literacy. According to the European Commission's DigComp 2.2 framework [29], digital competence involves the confident, critical, and responsible use of digital technologies for learning, working, and participating in society.

The OECD Future of Education and Skills 2030 [18] and other organizations emphasize the importance of "21st-century skills," which include creativity, critical thinking, problem-solving, and digital communication.

Prompt engineering-as taught in Prompting School-can be seen as a practical instantiation of these broader digital competencies, combining communication, design thinking, and reflective use of technology.

Overall, Prompting School is situated at the intersection of several emerging domains: AI literacy, digital competence, prompt engineering, and responsible AI usage. While the platform does not seek to replace broader AI education initiatives, it contributes meaningfully by offering a practical, scalable, and user-friendly entry point to one of the most critical skills in the age of generative AI.

Platform	Focus Area	Key Features
<b>OpenAI Prompt Engineering Guide</b>	AI Prompt Engineering For Developers	Structured guide with examples.
<b>DeepLearning.AI (Prompting Courses)</b>	AI Model Optimization	Advanced prompt engineering techniques,
<b>LearnPrompting.org [Accessed on 25th of March 2025]</b>	Community-Driven AI Prompting	Comprehensive and updated content.
<b>Coursera (AI Courses)</b>	AI, Machine Learning	University-led courses (e.g., Stanford) with structured content.
<b>Udemy (AI Courses)</b>	AI Fundamentals, Prompting	Self-paced courses with practical examples.
<b>Specialized University Courses (Stanford, MIT, etc.)</b>	AI Theory and Applications	Academic content with strong theoretical foundations.
<b>Prompting School, prompting-school.com and prompting.schule</b>	AI Literacy, Prompting, Ethics	Structured, interactive learning with real-time feedback, AI-assisted exercises, assessments, and ethical discussions.

Table 2.1.: Comparison of AI Literacy and Prompt Engineering Platforms

### 2.1.5. Previous Literature Reviews on Generative AI in Education

To ensure that the development of Prompting School is grounded in relevant educational and technological research, I draw on insights from two prior systematic literature reviews I conducted on generative AI in education.

The first review, titled *"Harnessing the Power of Artificial Intelligence and ChatGPT in Education - A First Rapid Literature Review"* [12], was presented at the EdMedia + Innovate Learning conference in 2023. This study followed the methodology proposed by PRISMA guidelines to identify and analyze 41 sources discussing the use, advantages, and challenges of ChatGPT in educational contexts. The review concluded that ChatGPT is already widely used in both teaching and learning, particularly in higher education, and highlighted common use cases such as exam generation, summarization, and critical thinking enhancement. However, it also identified limitations such as plagiarism, AI hallucinations, and ethical concerns.

Building on this work, the second review [13], titled *"Exploring the Use of Generative AI in Education: Broadening the Scope"*, extended the scope beyond ChatGPT to include other generative AI tools such as Google Bard, Bing Chat, and DALL-E. It incorporated 100 academic papers, classifying them by subject focus, type of research (qualitative, quantitative, or mixed), educational level, and perceived impact. This review revealed that generative AI is most commonly used in tertiary education, especially in STEM fields, with a generally positive reception. The review also uncovered common use cases such as AI-supported content creation, personalized tutoring, research assistance, and curriculum planning. Ethical, social, and infrastructural concerns were also addressed.

The insights gained from these two reviews directly influenced the pedagogical design and content of Prompting School. For instance, the practical focus on prompt engineering as an essential AI skill emerged as a result of identifying the educational needs and skill gaps related to the use of large language models. Furthermore, both studies helped shape the platform's commitment to ethical prompting practices, accessibility, and iterative learning through experimentation.

## 2.2. UNESCO's AI competency framework for students and Its Alignment with Prompting School

AI literacy, or artificial intelligence literacy, is the ability to understand, use, monitor, and critically reflect on AI applications. The term usually refers to teaching skills and knowledge to the general public, particularly those who are not adept in AI. AI literacy is a critical skill in the present era [26, 27].

In developing the Prompting School course, a conscious effort was made to align its content with the competencies outlined in UNESCO's AI Competency Framework for Students. This global framework emphasizes not only technical knowledge, but also ethical awareness, human-centred design, and responsible use of AI. While the target audience of Prompting School extends beyond students, many of the core competencies-

such as critical thinking about AI systems, ethical usage, and practical application of AI tools-are equally relevant. The ways in which specific competencies from the framework are addressed through the course design will be discussed in detail later in this section. The AI Competency Framework by UNESCO addresses the urgent need to prepare learners not only to use AI tools but to navigate their implications. Its integration into public education is essential to prevent the privatization of AI knowledge and to build democratic, sustainable digital societies. The framework consists of two dimensions:

1. **Competency Areas** - These define the broad categories of AI literacy skills and there are four of them.
2. **Progression Levels** - Each competency area is further divided into three levels reflecting increasing proficiency.

### 2.2.1. Competency Areas

The AI Competency Framework identifies four key competency areas:

- **Human-Centered Mindset** - Ensuring AI aligns with human values, intent, and fairness.
- **Ethics of AI** - Recognizing and mitigating ethical risks such as bias, misinformation, and responsible use.
- **AI Techniques and Applications** - Understanding and utilizing structured approaches to interacting with AI systems effectively.
- **AI System Design** - Developing structured workflows to refine AI outputs iteratively.

### 2.2.2. Progression Levels

Each competency area is structured into three levels, representing increasing depth of engagement with AI concepts and practices:

- **Understand** - Basic awareness and knowledge of AI concepts, focusing on recognizing how AI functions and its implications.
- **Apply** - Practical ability to engage with AI, ensuring responsible usage through structured interactions and ethical considerations.
- **Create** - Advanced competency in AI design, including system development, ethical integration, and optimizing AI workflows.

The framework's structure is summarized in Table 2.2.

The following paragraphs provide a deeper explanation of the four core competency areas defined in UNESCO's AI Competency Framework for Students and their significance in AI education. Each area is structured into three progression levels: Understand, Apply, and Create, which reflect increasing depth of knowledge and responsibility [26].



**Human-Centered Mindset** This area emphasizes a value-oriented and ethically reflective interaction with AI. At the Understand level, students begin to recognize the importance of human agency and learn that AI systems should support, not replace, human decision-making. They are introduced to the idea that humans must remain accountable for AI-supported outcomes. At the Apply level, learners critically assess whether AI is appropriate for a given context and how it can be used responsibly in daily life. They begin to take into account fairness, inclusivity, and alignment with human dignity. At the Create level, students are expected to demonstrate digital citizenship in the era of AI, engaging with AI systems to promote societal benefit and using their knowledge to advocate for human-centered AI design.

**Ethics of AI** This competency area is essential in helping learners understand the broader ethical challenges and societal risks associated with AI technologies. At the Understand level, students explore concepts such as embodied ethics and are introduced to issues like surveillance, discrimination, and bias in AI systems. At the Apply level, they are expected to use AI tools safely and responsibly, integrating ethical awareness into their actions-this includes evaluating AI outputs for fairness or bias. At the Create level, learners are encouraged to apply the concept of "ethics by design," which involves embedding ethical principles directly into AI development processes and advocating for systems that are transparent, accountable, and socially beneficial.

**AI Techniques and Applications** This area focuses on building both conceptual understanding and practical competence in interacting with AI systems. At the Understand level, students explore foundational ideas such as how AI uses data and algorithms, how it differs from traditional computing, and how it appears in everyday life. This also includes learning to identify common uses and limitations of AI tools. At the Apply level, learners begin to use age-appropriate tools and datasets, apply basic programming or prompting techniques, and critically analyze AI behavior. They are encouraged to think practically and assess the relevance and impact of AI in solving real-world problems. At the Create level, students work toward developing or customizing their own AI tools and workflows. They apply advanced skills and collaborate on complex tasks-often with a focus on creativity, problem-solving, and real-world utility.

**AI System Design** This area supports the development of structured thinking and system-level planning skills required to build or refine AI solutions. At the Understand level, students are introduced to the concept of problem scoping-understanding when and why to use AI, and defining the problem clearly before applying any AI solution. This includes assessing potential risks, ethical challenges, and success criteria. At the Apply level, they engage with architecture design, planning system components, and considering how inputs, models, and outputs relate. This stage integrates interdisciplinary thinking, combining computational logic with ethical and human-centered concerns. At the Create level, students iteratively refine AI systems based on user feedback, performance data, or emerging insights. They demonstrate adaptive thinking and may even

Table 2.2.: UNESCO AI Competency Framework: Competency Aspects and Progression Levels

Competency Aspects	Understand	Apply	Create
<b>Human-Centered Mindset</b>	Human agency	Human accountability	Citizenship in the era of AI
<b>Ethics of AI</b>	Embodied ethics	Safe and responsible use	Ethics by design
<b>AI Techniques and Applications</b>	AI foundations	Application skills	Creating AI tools
<b>AI System Design</b>	Problem scoping	Architecture design	Iteration and feedback loops

decide to retire an AI system if it fails to meet social or technical standards.

### 2.2.3. Alignment with Prompting School

It is important to note that the Prompting School course was not initially designed to comprehensively address the UNESCO AI Competency Framework for Students. Its original focus was on teaching effective prompt engineering strategies for interacting with generative AI systems. However, through multiple iterations, the scope of the platform expanded to intentionally incorporate key competencies outlined in the UNESCO framework. In the first version of the website, efforts were made where applicable to align course content with relevant aspects of the framework. One of the greatest strengths of the Prompting School platform lies in its flexibility and modular design, which allows for the easy integration of additional courses or modules. This adaptability provided a solid foundation for more systematically addressing the full range of competencies in later versions. As a result, the second iteration of the website reflects a more deliberate alignment with the UNESCO AI Competency Framework.

Table 2.3 summarizes how the first version of Prompting School addresses the framework across different progression levels. Table 6.1 summarizes how the second version of Prompting School addresses the framework across different progression levels. They identify areas of strong coverage, partial coverage, and gaps.

Competency Area	Progression Level	Covered by Prompting School
<b>Human-Centered Mindset</b>	<b>Human Agency</b>	<b>Partially</b> - Learners actively shape AI responses.
Continued on next page		

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Competency Area	Progression Level	Covered by Prompting School
	<b>Human Accountability</b>	<b>No</b>
	<b>Citizenship in the era of AI</b>	<b>Partially</b> - The course encourages engagement with AI, provides tools for experimentation, and likely motivates learners to keep exploring AI
<b>Ethics of AI</b>	<b>Embodied Ethics</b>	<b>No</b>
	<b>Safe and Responsible Use</b>	<b>No</b>
	<b>Ethics by Design</b>	<b>No</b>
<b>AI Techniques and Applications</b>	<b>AI Foundations</b>	<b>Yes</b> - Learners build conceptual awareness through prompt-response behavior.
	<b>Application Skills</b>	<b>Yes</b> - Strong practical component; Prompt Lab reinforces learning.
	<b>Creating AI Tools</b>	<b>No / Partially</b> - Not part of course scope; appropriate for more advanced/technical learners. Although the course teaches how to optimize interactions with AI.
<b>AI System Design</b>	<b>Problem Scoping</b>	<b>Partially</b> - Learners recognize suitable use cases but don't explicitly define problems.
	<b>Architecture Design</b>	<b>Partially</b> - Prompt crafting involves goal-driven thinking but lacks structured design framing.
	<b>Iteration and Feedback Loops</b>	<b>Yes</b> - Strongly supported via the Prompt Laboratory's feedback-and-refinement process.

Table 2.3.: Coverage of AI Competency Framework in Prompting School

While the Prompting School course provides strong coverage of AI literacy competencies, future iterations could expand its focus on AI ethics, regulatory considerations, and system-level AI design.

## 2.3. DigComp 2.3 AT: Austria's Digital Competence Framework

As digital technologies continue to transform society, education systems are under pressure to equip individuals with the necessary skills to navigate and shape this transformation responsibly. In response to this, Austria introduced DigComp 2.3 AT, the national adaptation of the European Digital Competence Framework (DigComp 2.2), in 2022. The model was developed by the Austrian initiative fit4internet in collaboration with several public institutions and aligns with broader European strategies on digital literacy [17].

DigComp 2.3 AT retains the structural backbone of its European predecessor while introducing Austria-specific dimensions. It defines six competence areas, each subdivided into specific competences and described across eight proficiency levels, which are aligned with the National Qualifications Framework (NQR). Furthermore, the Austrian version introduces foundational aspects such as access to infrastructure, digital participation, and sustainability, thereby broadening the scope of digital literacy to include social and democratic dimensions.

### 2.3.1. Structure of the Framework

The six competence areas defined in DigComp 2.3 AT are:

1. **Basics and Access** - Fundamental skills related to using digital devices, infrastructure, and connectivity.
2. **Information and Data Literacy** - The ability to search for, evaluate, and manage digital information.
3. **Communication and Collaboration** - Competences related to online interaction, digital identity, and collaborative tools.
4. **Creation and Publishing** - Skills in content creation, editing, and understanding copyright and licensing.
5. **Security and Sustainability** - Awareness of digital risks, environmental impacts, and sustainable device usage.
6. **Problem Solving and Lifelong Learning** - The ability to troubleshoot digital issues and continually learn in digital environments.

Each of these areas includes multiple individual competencies and is mapped across eight proficiency levels, ranging from foundational to advanced. This structure provides a flexible and scalable model for assessing digital competence across diverse user groups.

### 2.3.2. Educational Relevance

DigComp 2.3 AT plays a central role in Austria's digital education strategy. It is used for designing curricula in schools, adult education, and professional training. The framework serves as a self-assessment and certification tool, guiding learners and educators in evaluating their digital skill levels. In this way, it supports lifelong learning and enhances Austria's broader effort to foster a digitally competent population.

One of the key innovations in the Austrian model is the inclusion of access and participation as formal competence areas. This emphasizes the importance of not only technical skills, but also digital inclusion, equal opportunities, and active democratic engagement in a digitized society.

### 2.3.3. Relation to Prompting School

While DigComp 2.3 AT is not AI-specific, several of its dimensions are highly relevant to platforms like *Prompting School*. The course supports the development of the following competence areas:

- **Creation and Publishing:** Learners actively create meaningful prompts and analyze the generated responses, enhancing their creative digital expression.
- **Information and Data Literacy:** The process of evaluating AI-generated responses sharpens users' skills in assessing credibility, accuracy, and relevance of information.
- **Problem Solving and Lifelong Learning:** The iterative learning structure of the Prompt Laboratory encourages exploration, critical thinking, and independent learning through experimentation.
- **Basics and Access:** By offering a low-threshold, browser-based interface with no installation requirements, Prompting School contributes to digital accessibility.

Although not originally designed with DigComp 2.3 AT in mind, Prompting School aligns with several aspects of the framework and holds the potential to contribute meaningfully to digital competence development in Austria-particularly in the areas of applied AI usage, critical reflection, and creative digital practice.

## 2.4. Course Content of Prompting School

The instructional design of Prompting School is grounded in the official strategies for effective prompt engineering published by OpenAI. These strategies, outlined in the guide available at <https://platform.openai.com/docs/guides/prompt-engineering>, form the conceptual backbone of the course. For the initial implementation of the course, four out of the six strategies were selected:

### 1. Write Clear Instructions

2. **Provide Reference Text**
3. **Split Complex Tasks into Simpler Subtasks**
4. **Give the Model Time to "Think"**

These strategies were chosen for their foundational importance and practical relevance. They are suitable for beginners and non-technical users, offering immediate usage in real-world applications of prompt engineering. Each strategy is addressed in a dedicated lesson, which includes theoretical explanations, examples, and interactive exercises.

To assess understanding and encourage reflective application, each lesson concludes with a quiz. These assessments feature a variety of item types-including *True/False*, *multiple-choice questions (MCQs)*, and *scenario-based tasks*-designed to evaluate both conceptual understanding and the learner's ability to apply prompting techniques in context.

In addition to the core lessons, the platform incorporates a dedicated module called the *Prompt Laboratory*. This interactive component enables learners to experiment with real-world prompt examples sourced from OpenAI's example repository at <https://platform.openai.com/docs/examples>. The laboratory showcases both strong and weak prompt formulations, allowing users to revise and compare outputs interactively. This sandbox-like environment enables hands-on learning, iterative exploration, and a deeper appreciation of prompt engineering nuances.

The combination of structured lessons with targeted assessments and an open-ended experimentation space supports a blended learning approach. It ensures that learners not only acquire theoretical knowledge but also develop practical competence through continuous feedback and exploration.

To provide a clear overview of the course content, Table 2.4 summarizes the four strategies and their associated tactics, along with an indication of their inclusion in the current version of the course.

Table 2.4.: Overview of Prompt Engineering Strategies and Tactics in Prompting School

Strategy	Tactics	Included in Course
<b>Write Clear Instructions</b>	<ul style="list-style-type: none"> <li>• Include details in your query to get more relevant answers</li> <li>• Ask the model to adopt a persona</li> <li>• Use delimiters to clearly indicate distinct parts of the input</li> <li>• Specify the steps required to complete a task</li> <li>• Provide examples</li> <li>• Specify the desired length of the output</li> </ul>	Yes
<b>Provide Reference Text</b>	<ul style="list-style-type: none"> <li>• Instruct the model to answer using a reference text</li> <li>• Instruct the model to answer with citations from a reference text</li> </ul>	Yes
<b>Split Complex Tasks into Simpler Subtasks</b>	<ul style="list-style-type: none"> <li>• Use intent classification to identify the most relevant instructions for a user query</li> <li>• For dialogue applications that require very long conversations, summarize or filter previous dialogue</li> <li>• Summarize long documents piecewise and construct a full summary recursively</li> </ul>	Yes
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Strategy	Tactics	Included in Course
<b>Give the Model Time to "Think"</b>	<ul style="list-style-type: none"> <li>• Instruct the model to work out its own solution before rushing to a conclusion</li> <li>• Use inner monologue or a sequence of queries to hide the model's reasoning process</li> <li>• Ask the model if it missed anything on previous passes</li> </ul>	Yes



## 3. Methodology

This chapter outlines the methodological framework used for developing and evaluating the "Prompting School," a web-based educational platform designed to teach prompt engineering skills in an asynchronous self-paced environment. The primary objective of this research was to create and validate an interactive online course aimed at enhancing users' competencies in effectively interacting with generative AI systems such as ChatGPT.

### 3.1. Research Design

Given the practical and exploratory nature of this project, a design science research (DSR) approach was chosen as the overarching methodology. DSR is particularly suitable for information systems and educational technology research, focusing on the iterative creation and evaluation of innovative artifacts intended to solve practical problems [10]. The study consisted of four main phases as illustrated in Figure 3.1:

1. **Artifact Development:** This phase encompassed the conception, design, and technical implementation of the "Prompting School" web platform and the online prompt engineering course. The course content and structure were based on existing literature and best practices in prompt engineering, particularly incorporating recommended strategies from authoritative resources such as OpenAI's Prompt Engineering Guide [21].
2. **Artifact Evaluation (Proof of Concept):** After developing the web-based course, an empirical evaluation was conducted to assess the platform's usability, perceived usefulness, and educational effectiveness. This was carried out through an online questionnaire after the users finished the course or a part of it. The full questionnaire can be found in Appendix.

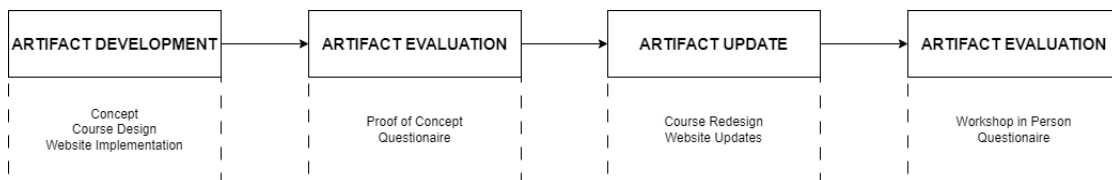


Figure 3.1.: Overview of the research design, highlighting the four main phases of the study.

3. **Artifact Update:** Based on the findings from the initial evaluation, the Prompting School platform was revised and improved. This phase included a redesign of the course structure, focusing more on UNESCO’s AI competency framework for students [26]. The updated version focused also on integration of user feedback, and technical updates.
4. **Artifact Evaluation (Teacher Workshop):** In the final evaluation phase, the updated version of Prompting School was tested in an in-person workshop with 21 in-service teachers. Participants explored the platform, completed a standardized questionnaire, and provided qualitative feedback in a group discussion. This allowed for deeper insights into the platform’s educational value, usability, and alignment with the UNESCO AI Competency Framework.

## 3.2. Participants and Sampling

A convenience sampling strategy was used, targeting individuals interested in or working with generative AI. Participants were recruited through professional, academic networks and direct invitations. In total, 19 respondents participated in the evaluation, providing initial user insights into the platform’s effectiveness and usability.

## 3.3. Data Collection Method

The data was collected using an online questionnaire designed specifically to capture user experiences and opinions. The questionnaire comprised both quantitative and qualitative items:

- **Quantitative items** included Likert-scale questions evaluating usability, satisfaction, and perceived learning effectiveness.
- **Qualitative items** consisted of open-ended questions that allowed respondents to elaborate on their experiences, offer suggestions for improvement, and highlight perceived strengths and weaknesses of the platform.

The questionnaire was distributed online via Google Forms, providing a simple, familiar interface for participants and streamlined data collection for subsequent analysis. No personal identification parameters were collected.

Data collected through the questionnaire were analyzed using a mixed-method approach:

- **Descriptive statistical analysis** was employed for the quantitative responses, providing initial insights into general user satisfaction, usability, and perceived educational outcomes.
- **Qualitative content analysis** was used to analyze open-ended responses systematically. Responses were coded and categorized to identify recurring themes, strengths, challenges, and suggestions for improvement.

This mixed-methods approach allowed a comprehensive and balanced interpretation of user feedback, enriching the quantitative data with meaningful qualitative insights. Given the exploratory and practical nature of this project, the chosen methods provided a solid foundation for initial validation and provided insights for future improvements and more extensive studies. Second version of the website was developed together with my mentor, Benedikt Br  nner. Second evaluation phase, an in-person workshop with 21 in-service teachers, was conducted as part of an iterative development cycle aligned with the Design Science Research methodology. The goal was to gather structured feedback on the revised platform (Version 2) through guided exploration, a standardized questionnaire, and group discussion. The workshop provided a valuable opportunity to observe real-time interaction, discuss use cases, and assess alignment with the UNESCO AI Competency Framework.



## 4. Software Architecture and Implementation

Prompting school is a web-based platform created and designed to allow interactive learning of prompt engineering and the effective use of language-based AI. It consists of a frontend built with Svelte, a backend implemented in Python using Flask, and a PostgreSQL database for persistent data storage. The system also integrates OpenAI's ChatGPT to provide interactive AI-powered assistance. The overall architecture of the platform is illustrated in Figure 4.1.

The architecture follows a client-server model where the frontend communicates with the backend via RESTful API. The backend handles authentication, data processing, and AI-driven functionalities, while the database stores user progress, number of prompt experiments, and other relevant information.

### 4.1. Frontend: Svelte Implementation

The frontend is developed using Svelte, which is a JavaScript framework [25]. Svelte is a web framework designed for building user interfaces. Unlike traditional JavaScript frameworks, it compiles components written in HTML, CSS, and JavaScript into optimized JavaScript code that runs in the browser efficiently [25]. The frontend of the Prompting School platform is responsible for delivering an intuitive and interactive user experience. It serves as the primary interface for users to access lessons, quizzes and experiment with prompt engineering techniques in real time. Svelte's declarative syntax enabled fast development and simplified UI state management. The decision to use Svelte was based on its growing popularity as a modern frontend framework and was further supported by the recommendation of the thesis advisor. Its lightweight architecture and suitability for fast prototyping made it an appropriate choice for this educational platform.

#### 4.1.1. Component Structure

The frontend of the Prompting School platform is structured around distinct pages and interactive elements, each serving a specific function in the learning process, see Figure 4.2. Different lessons and quizzes are implemented separately without extensive reuse of UI components.

##### Main Pages

The platform consists of several core pages that define the overall user experience:

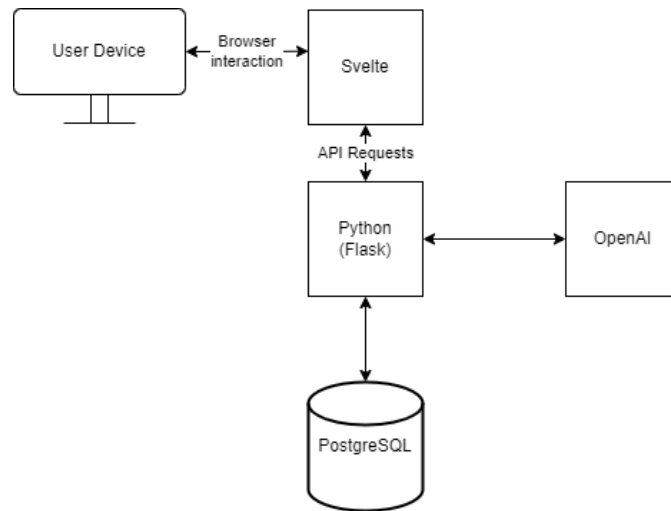


Figure 4.1.: System Architecture of the Prompting School

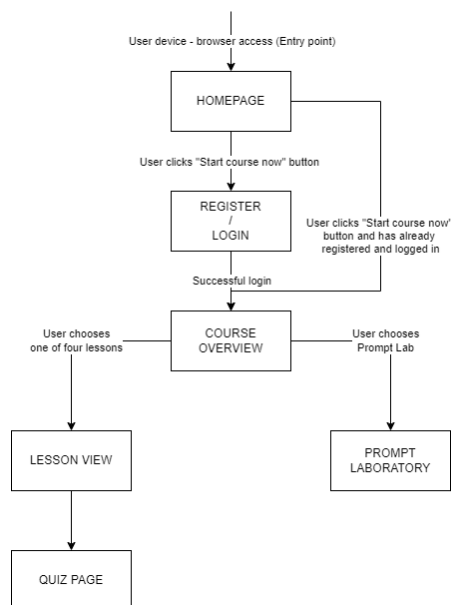


Figure 4.2.: Frontend navigation structure of Prompting School. The user begins at the homepage and proceeds through authentication to access the course overview. From there, they can enter either the structured lesson flow or the open-ended Prompt Laboratory. Each view is implemented as a modular Svelte component and contributes to the overall learning journey.

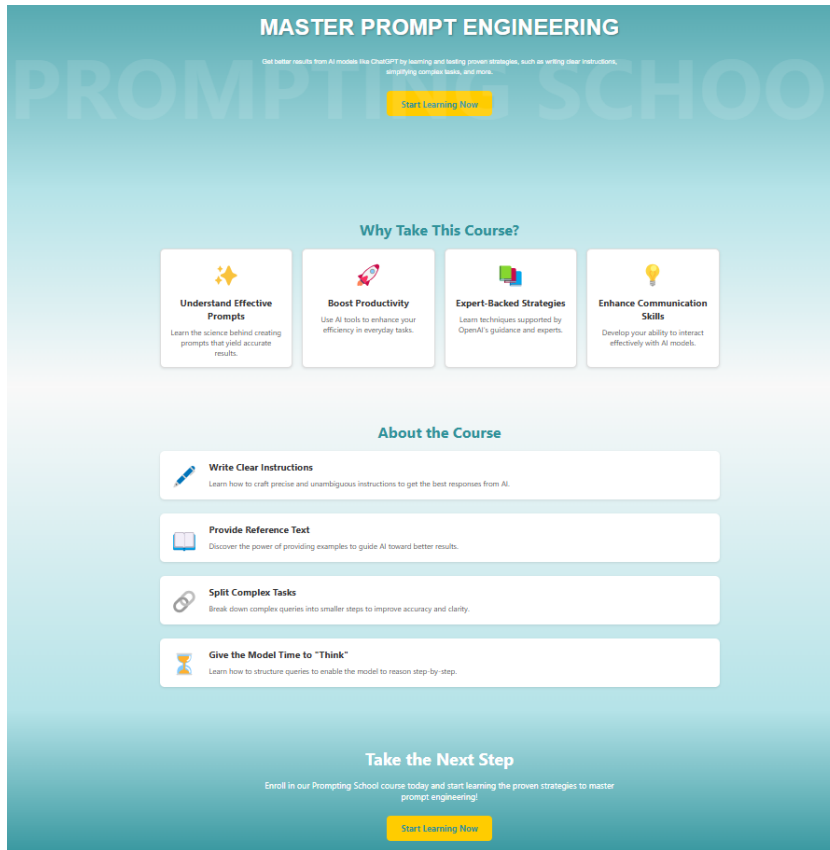


Figure 4.3.: The homepage of Prompting School, highlighting key course benefits and learning strategies.

**Homepage** - The first page users see when they visit the platform. It contains a hero section, an introduction to the course, and a prominent "Start Learning Now" button that leads to the registration or login or course page. See Figure 4.3

**Course Page** - Displays an overview of all lessons, tracks user progress, keeps track of prompts tried on the website, and provides access to the Prompt Laboratory. It also includes an option to download a certificate after completing the course. See Figure 4.4

**Login and Registration Pages** - Handle user authentication, sending login credentials to the backend, which returns a JWT token used for subsequent API requests. See Figure 4.5

## Lesson and Quiz Pages

Each lesson and quiz is implemented as a separate page, meaning that lessons are not dynamically generated from a shared template but instead have individual structures:

**Lesson Pages (1-4)** - Each lesson contains structured content, including text explanations, examples, and a navigation bar at the top that allows users to go back to the

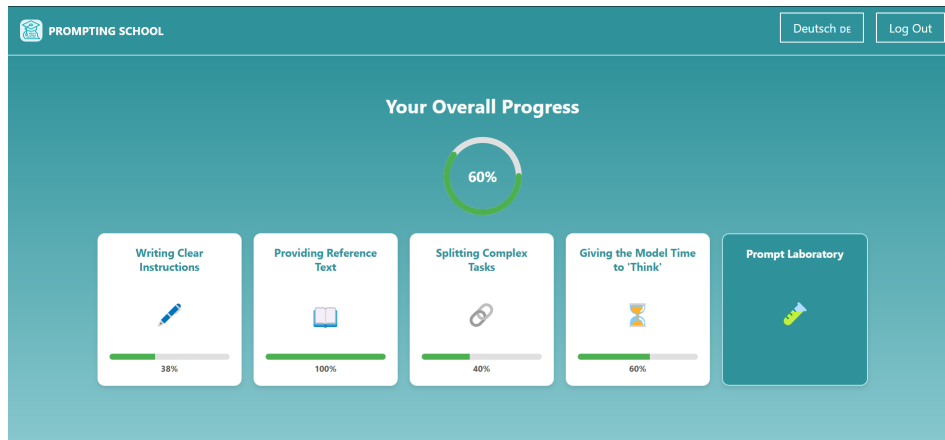


Figure 4.4.: Course Page of Prompting School, displaying user progress and lesson tracking.

The login page features a teal header with the title 'Login'. Below it, there are two input fields: 'Email Address' with the placeholder 'Enter your email' and 'Password' with the placeholder 'Enter your password'. A teal 'Login' button is positioned below the password field. At the bottom, there is a link 'Don't have an account?' and a 'Register' button.

The register page features a teal header with the title 'Register'. Below it, there are two input fields: 'Email Address' with the placeholder 'Enter your email' and 'Password' with the placeholder 'Create a password'. Below the password field, there is a checkbox labeled 'I agree to the Terms and Conditions'. A teal 'Register' button is positioned below the checkbox. At the bottom, there is a link 'Already have an account?' and a 'Log In' button.

Figure 4.5.: Login page (left) and Register page (right) of Prompting School. These user interface components provide access control to the learning platform.



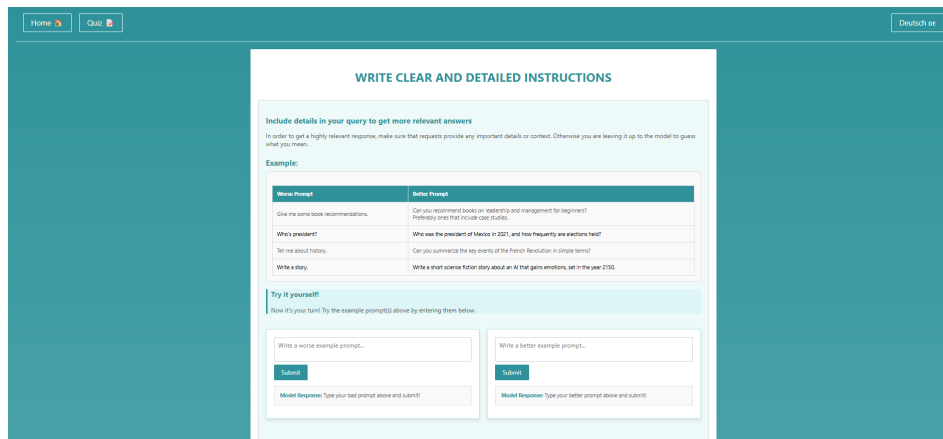


Figure 4.6.: Example of a lesson page in Prompting School, demonstrating the difference between weak and strong prompts.

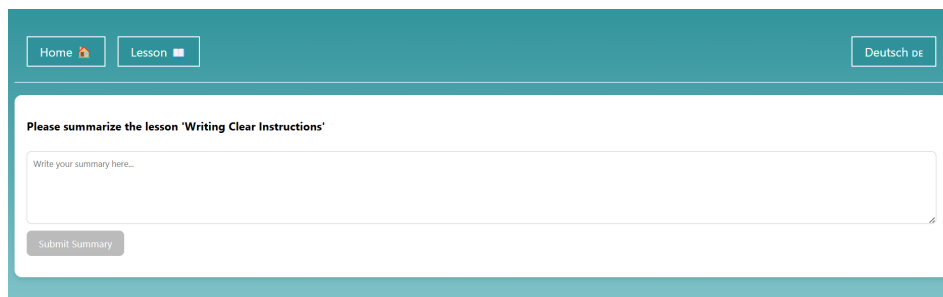


Figure 4.7.: Lesson summary submission interface before accessing the quiz. Users must summarize the lesson before proceeding to multiple-choice questions.

course page, access the quiz, or see it in English or German. See Figure 4.6

**Quiz Pages (1-4)** - Each quiz contains first an open-ended question where the user has to summarize the lesson, and secondly the multiple-choice questions relevant to its lesson, with real-time scoring and an option to retry the quiz after completion. See Figure 4.7, 4.8 and 4.9

## Interactive Elements

To enhance learning, the platform includes interactive features that allow users to engage with AI-generated responses:

**Prompt Laboratory** - A key feature of the platform where users can experiment with prompts in different real-life scenarios. The user writes a prompt and submits it. The prompt is then processed in backend and an answer is returned and displayed to the user. The system provides AI-generated responses along with comparisons between "better" and "worse" prompts, helping users refine their prompting skills. See Figure 4.10, 4.11, and 4.12. Many of the example scenarios are adapted from use cases provided by

**Please summarize the lesson 'Splitting Complex Tasks'**

**Lesson Summary: Split Complex Tasks Into Simpler Subtasks**  
 This lesson focuses on breaking down complex tasks into smaller, more manageable subtasks to improve model performance and accuracy.

**Key Concepts:**  
 Intent Classification for Relevant Instructions

To enhance response quality, classify user queries into primary and secondary categories before generating a response.  
 Example: A customer service chatbot can categorize queries into Billing, Technical Support, Account Management, or General Inquiry, then further classify them into specific subcategories (e.g., Password Reset, Troubleshooting).  
 Handling Long Conversations in Dialogue Applications

Since AI models have a fixed context length, long conversations must be managed effectively.  
 Possible solutions:  
 Summarizing previous dialogue turns to fit within the model's context window.  
 Asynchronous background summarization to maintain conversation history efficiently.  
 Summarizing Long Documents Recursively

**Submit Summary**

**AI Response:** Your summary effectively captures the key takeaways of the lesson, focusing on the main strategy of splitting complex tasks into simpler subtasks. You also mention the tactic of intent classification for handling user queries, which is crucial. Additionally, your discussion on managing long conversations and summarizing documents piecewise is clear and well-structured. However, be sure to integrate specific terminology associated with tactics, ensuring that all key tactics are distinctly highlighted.

✅ Summary accepted! You can now proceed to the quiz.

Figure 4.8.: Example of a student-written summary that was positively evaluated by the system. The backend sends both the lesson content and the student's summary to the language model with a structured prompt requesting a JSON-formatted evaluation. The model responds with a boolean indicating accuracy and feedback highlighting strengths or areas for improvement. This automated evaluation guides the learner and promotes reflective summarization.

**Question 1:**  
 Why is it important to provide specific details in a prompt?

☐ It ensures the AI responds faster.

☐ It increases the likelihood of a relevant and accurate response.

☐ It makes the response longer, regardless of accuracy.

☐ It allows the AI to guess the answer freely.

**Question 2:**  
 Which of the following is an example of a well-structured prompt?

☐ Tell me about programming.

☐ Explain recursion in Python with an example and a step-by-step explanation.

☐ How does AI work?

☐ Write me something about technology.

Figure 4.9.: Example of a multiple-choice quiz page in Prompting School. Users answer conceptual questions related to the lesson topic.

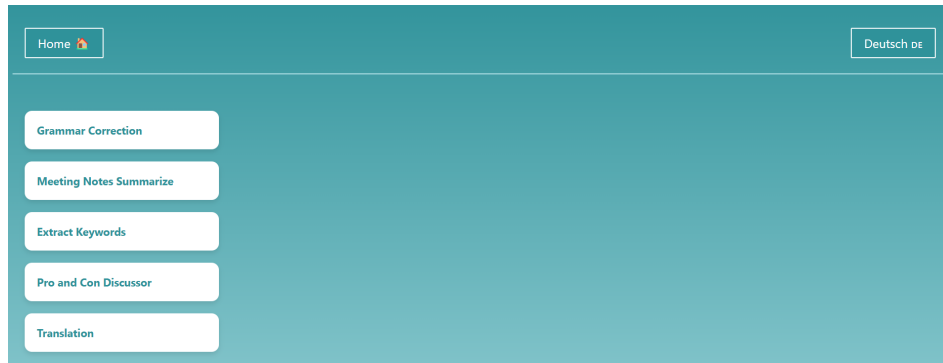


Figure 4.10.: Prompt Laboratory interface where users can select from a range of real-world examples to practice prompt engineering. Each example represents a specific use case or task, allowing learners to experiment with different prompt formulations and immediately observe the model’s output. This feature encourages hands-on learning and iterative refinement of prompts.

OpenAI in their official documentation [20].

**Lesson Summary Submission Before Quiz** - Before accessing the multiple-choice quiz, users must write a summary of the lesson in their own words. This ensures that they actively reflect on what they have learned. The system evaluates whether the summary sufficiently covers the key points before allowing access to the quiz. See Figure 4.13.

**Quiz Results Display** - After completing a quiz, users receive instant feedback, including their score and an option to retry or return to the course page. At the end of each quiz, users receive instant feedback with their score and the option to retry or return to the course page. See Figure 4.14.

**Prompt Experimentation Inside Lessons** - Each lesson contains built-in prompt experimentation areas, where users can apply the specific tactic being taught. These interactive sections allow users to input prompts related to the lesson’s topic and receive AI-generated responses. This enables hands-on practice. See Figure 4.15.

## Navigation and Progress Tracking

Although not structured as reusable components, the following elements appear consistently across the platform:

**Navigation Bar** - Present at the top of most pages, allowing users to navigate between lessons, the course page, and the Prompt Laboratory. See Figure 4.16.

**Progress Tracker** - Displays how many prompts the user has completed and their overall progress in the course. See Figure 4.17.

### Grammar Correction

Imagine you're writing an **important email** to your manager, but you're unsure if your grammar is correct. You don't want to sound unprofessional, so you use this tool to **instantly correct your writing** before sending it.

**Example Email (Before Correction):**

*Subject: Important meeting about project update*

*Hello Mr. Johnson,*

*I hope this email finds you good. I am writing regarding the last meeting we had yesterday. There was many informations discussed, and I want to make sure we are align on the next steps.*

*Can you please confirm when we will having the next review meeting? Also, I will appreciated if you can send me the latest report, because I think some datas were missing in the last version.*

*Looking forward to hear from you soon.*

*Best regards,*  
*Michael*

**Task:** You have written an email to your manager, but you're unsure about the grammar. Write a prompt below to correct the grammar of your email.

Write your prompt to check and/or fix email ...

Figure 4.11.: An example scenario from the Prompt Laboratory focused on grammar correction. The user is presented with a poorly written email and is tasked with crafting an effective prompt to improve its grammar using a generative AI model. This interactive setup encourages users to experiment with prompt phrasing and observe how subtle changes affect AI output quality.

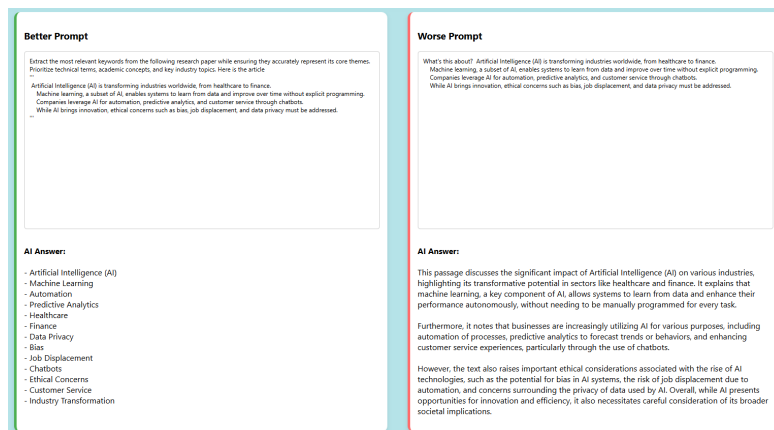


Figure 4.12.: A comparison between a well-structured prompt and a vague prompt in the Prompt Laboratory's grammar correction scenario. The left side demonstrates how detailed instructions yield a clearer and more polished AI response, while the right side shows the outcome of a minimal prompt with less precise instructions. The user sees these two options after submitting his or hers prompt. This example illustrates the importance of prompt clarity and specificity in achieving desired AI behavior.

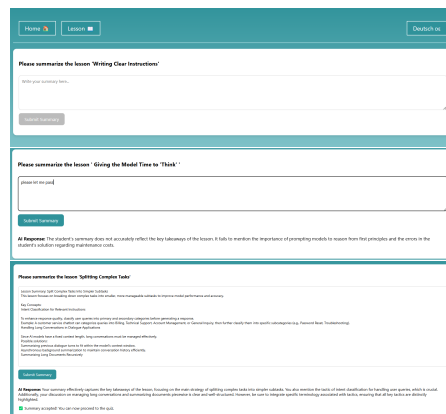


Figure 4.13.: Lesson summary interaction in Prompting School. In each lesson, users are asked to summarize the main takeaways. The submitted summary is evaluated by the AI model against the lesson content. The third image, on the bottom right, shows a well-formulated summary with positive feedback and acceptance, allowing the user to proceed to the quiz. The second image, bottom left, illustrates an invalid summary with rejection feedback, emphasizing that learners must engage meaningfully with the material before advancing.

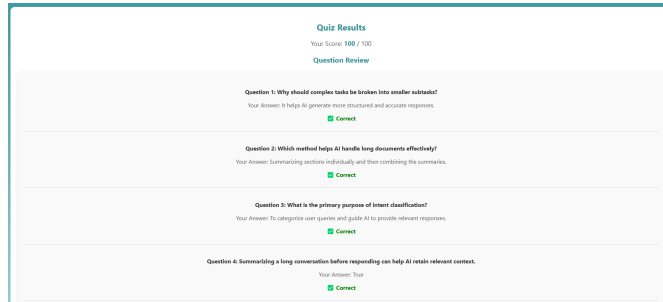


Figure 4.14.: Quiz result interface following the lesson on splitting complex tasks. After successfully completing the summary task, users proceed to a multiple-choice quiz that reinforces lesson content. This view displays the learner's answers, correctness feedback, and total score, supporting self-assessment and knowledge retention.

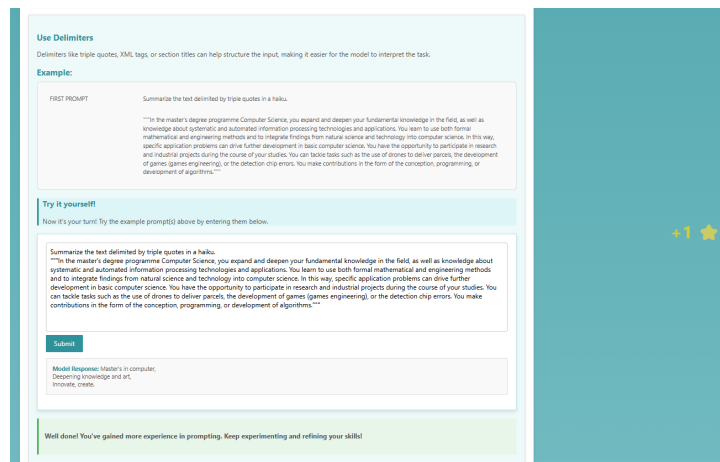


Figure 4.15.: Interactive prompt experimentation area embedded within a lesson. Learners are encouraged to apply the taught tactic-in this case, using delimiters-by entering their own prompts and instantly receiving AI-generated responses. This real-time feedback loop fosters active learning and allows users to immediately test and refine their prompting skills in context.



Figure 4.16.: Navigation bar of Prompting School, available in both English and German. It provides consistent access to key sections such as the homepage, lessons, quiz interface, and the Prompt Laboratory, enabling users to move seamlessly between course components and track their learning progress.

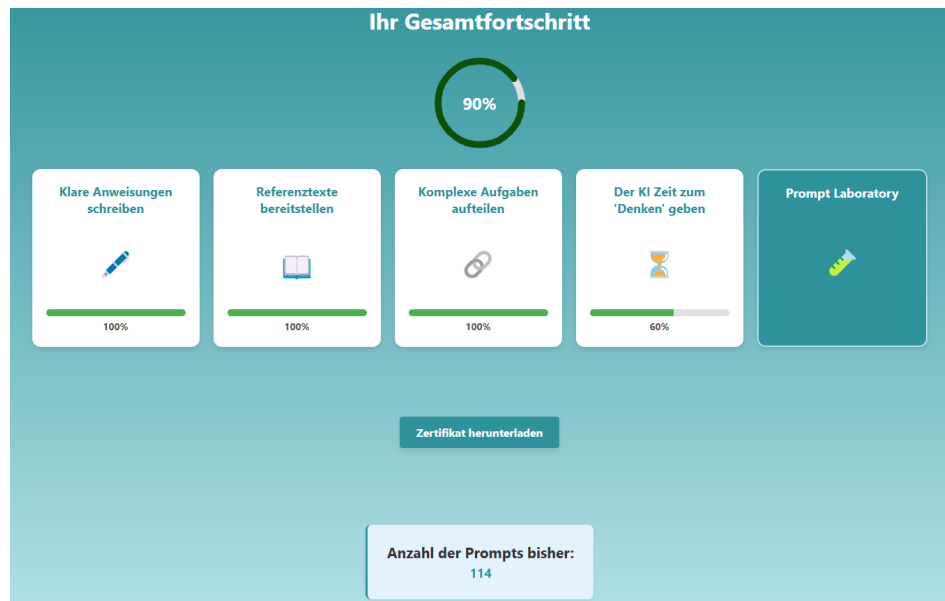


Figure 4.17.: Course progress tracker in Prompting School, displaying the user's completion status for each lesson and their overall progress in the course. Visual indicators show which lessons have been completed, encourage continued engagement, and provide a motivational overview of the learner's advancement. The total number of submitted prompts is also displayed as a measure of active participation.

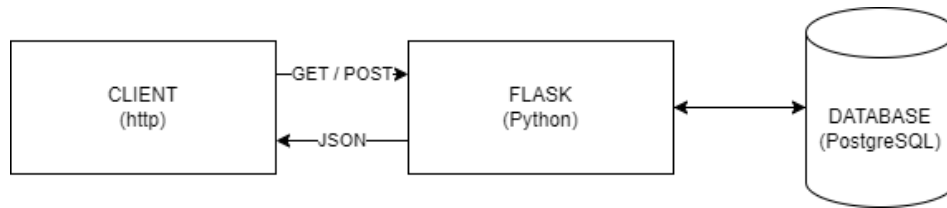


Figure 4.18.: RESTful communication between the frontend and backend, enabling functionalities such as user authentication, lesson tracking, prompt submission, and progress monitoring.

#### 4.1.2. Integration with Backend

The Prompting School frontend communicates with the backend via a RESTful API<sup>1</sup> over HTTPS, ensuring secure and reliable data transmission between the client and server. The frontend, built with Svelte, uses the Fetch API<sup>2</sup> to interact with the backend. Authentication is enforced globally across the platform: a JSON Web Token (JWT), stored in the browser's localStorage, is checked on each page load to validate the user's session. If the token or user ID is missing, the user is redirected to the login page. This mechanism ensures that all interactions—such as submitting prompts, accessing lessons, or tracking progress—are performed securely by authenticated users. See Figure 4.18. Responses are used to update the user interface or provide feedback in case of errors.

Following operations are the most important:

- User Authentication (Login/Register)
- Fetching Course Content (Lessons, Quizzes)
- Submitting Lesson Summaries
- Handling Prompt Experiments
- Tracking User Progress

Each request follows a standard RESTful approach, where the frontend sends HTTP GET, POST, and PUT requests to specific API endpoints.

#### Authentication and JWT Handling

To ensure secure access to course content, the backend implements JWT-based authentication:

- User Login - When a user enters their credentials, the frontend sends a POST request to the authentication endpoint.

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<sup>1</sup>Flask Documentation. Available at: <https://flask.palletsprojects.com> (Accessed: 31 March 2025).

<sup>2</sup>MDN Web Docs: Fetch API. Available at: [https://developer.mozilla.org/en-US/docs/Web/API/Fetch\\_API](https://developer.mozilla.org/en-US/docs/Web/API/Fetch_API) (Accessed: 31 March 2025).



- **JWT Token Generation** - If the credentials are valid, the backend returns a JWT token, which the frontend stores in localStorage. However, in the current implementation, the backend does not yet validate the JWT on incoming requests. This is an identified limitation and a point for future improvement to ensure secure session handling.
- **Session Persistence** - The frontend ensures that users remain logged in by checking for a valid JWT token on page reloads.
- **Data Exchange and State Management** - The frontend periodically communicates with the backend to fetch and update user progress, ensuring that:
  - Completed lessons and quizzes are recorded.
  - The number of prompt experiments is tracked.
  - Course completion status is updated, allowing users to download a certificate when eligible.

Once a user logs in, the frontend stores the JWT token and user ID in local storage:

```
localStorage.setItem("authToken", token );
localStorage.setItem("userId", userId);
```

Each "protected page" (lessons, quizzes, Prompt Laboratory) checks for authentication using the following logic:

```
onMount (() => {
  let userId = localStorage.getItem("userId");
  let authToken = localStorage.getItem("authToken");
  if (!authToken || !userId ) {
    navigate ("/de/login");
  }
});
```

By leveraging RESTful API communication, the frontend ensures a secure and efficient user experience, seamlessly integrating with the backend services.

## User Experience (UX) and Styling

The Prompting School platform is designed with a simple and intuitive user experience, ensuring that learners can easily navigate through the course, experiment with prompts, and track their progress. The design focuses on clarity, interactivity, and accessibility while keeping the styling approach lightweight and custom.

The platform adheres to fundamental User Experience (UX) principles to optimize engagement:

- **Simplicity and Focus** - The UI is designed to be clean and distraction-free, with a logical layout guiding users through lessons and quizzes.
- **Interactive Learning** - Users can experiment with prompts inside lessons, summarize key concepts, and complete quizzes to reinforce learning.

- **Clear Navigation** - The platform provides a consistent navigation bar to access lessons, quizzes, and the Prompt Laboratory easily.
- **Immediate Feedback** - Users receive instant responses after submitting prompts or completing quizzes, reinforcing active learning.

Prompting School platform is styled using custom CSS inside each Svelte component. Styling is defined directly inside individual Svelte components. Each page and element is styled independently, without a global styling system, which is probably not ideal. The approach is straightforward but less modular, as styles are embedded directly within each component rather than being shared across the project.

## 4.2. Backend: Flask and ChatGPT Integration

The backend of Prompting School is built using Flask, a lightweight and flexible web framework for Python. The backend application is structured using Flask Blueprints, separating authentication and user-related endpoints into modular components (auth.py, user.py). This promotes better code organization and maintainability. Cross-Origin Resource Sharing (CORS) was enabled both globally and at the blueprint level to ensure secure and seamless communication between the frontend (Svelte) and backend (Flask). It provides a robust API layer that facilitates communication between the frontend, the PostgreSQL database, and OpenAI's ChatGPT API. This section outlines the architectural components, core functionalities, and security measures implemented in the backend.

### 4.2.1. System Architecture

The backend follows a modular architecture, consisting of distinct components that handle authentication, user data management, prompt evaluation, and ChatGPT interactions. Figure 4.19 presents an overview of the system architecture.

The backend consists of the following core components:

- **Flask API Layer:** Manages user authentication, course progress tracking, and AI interactions.
- **PostgreSQL Database:** Stores user accounts, lesson progress, quiz scores, and prompt interactions.
- **ChatGPT API Connector:** Communicates with OpenAI's GPT-4 model to evaluate user-generated prompts and provide AI-generated responses.

### 4.2.2. Authentication and User Management

The authentication system is implemented using JSON Web Tokens (JWT) <sup>3</sup> to ensure secure access control. Users can register and log in through API endpoints, which store

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<sup>3</sup>Auth0 Documentation: JSON Web Tokens. Available at: <https://auth0.com/docs/secure/tokens/json-web-tokens> (Accessed: 31 March 2025).

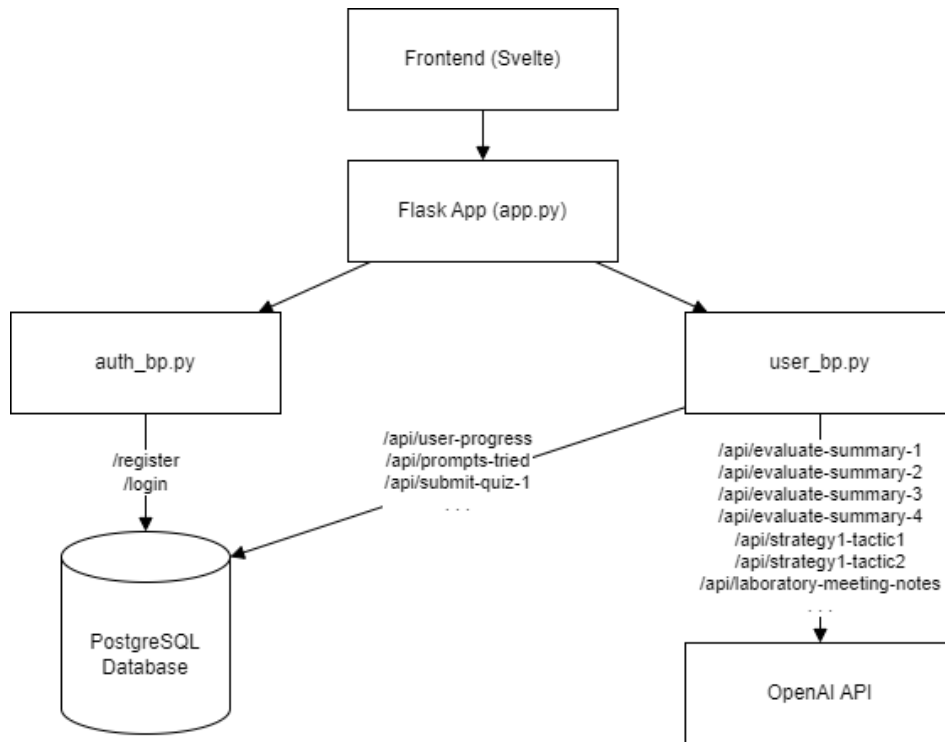


Figure 4.19.: Flask backend architecture of Prompting School. The backend consists of two modular Blueprints (`auth_bp` and `user_bp`) that handle authentication, prompt evaluation, quiz submission, progress tracking, and certificate generation. The backend interacts with a PostgreSQL database to manage persistent user data and communicates with the OpenAI API to evaluate user-submitted prompts and summaries.

credentials securely in PostgreSQL.

### User Registration

The `/register` endpoint allows users to create an account. During registration:

1. The API validates the provided email and password.
2. The PostgreSQL database is queried to check for existing accounts.
3. If no existing account is found, the new user is inserted into the database.
4. Initial progress records are created for all lessons within the course.

Upon registration, the backend initializes the user's progress by inserting default entries into the `user_progress` table for all lessons in the 'Prompting School' course.

### User Authentication

The authentication system uses JSON Web Tokens (JWT) with a 12-hour expiry to manage secure user sessions. Tokens include user ID and email, and are signed using an application-level secret key. Upon a successful login, a JWT is generated, containing:

- The user's ID and email.
- An expiration timestamp (set to 12 hours).

```
payload = {
    'user_id': user_id,
    'email': user_email,
    'exp': datetime.datetime.now(datetime.timezone.utc) + datetime.
        timedelta(hours=12)
}

...

token = jwt.encode(payload, SECRET_KEY, algorithm='HS256')

...

return jsonify({'token': token, 'userId': user_id}), 200
```

#### 4.2.3. Prompt Evaluation and AI Interaction

A key component of the Prompting School platform is the ability to dynamically evaluate user-generated prompts using the OpenAI ChatGPT API. This interaction is facilitated by the Flask backend, which exposes a set of endpoints for real-time communication between the user and the AI system. This integration enables not only the generation of AI responses to user prompts but also automated evaluation of prompt quality, feedback generation, and comprehensive tracking of user interactions.

## Prompt Processing and Response Generation

The platform supports multiple strategies and tactics for prompt engineering. When users submit a prompt-either within a lesson module or the Prompt Laboratory-it is sent to a designated API endpoint. The backend utilizes OpenAI's `gpt-4o-mini` model via the official `openai` Python package. For example, the route `/api/strategy1-tactic1` handles basic prompt interaction by sending the user's input directly to the model and returning the generated response. See Listing 4.1

```
chat_completion = client.chat.completions.create(
    messages=[
        {"role": "user", "content": prompt}
    ],
    model="gpt-4o-mini",
)
```

Listing 4.1: Sending user prompt to GPT-4o-mini API

## Persona-Based Prompting

Some strategies require multiple conversational turns and context awareness. In the `/api/strategy1-tactic2` route, a two-step interaction is implemented: first setting a system-level persona, followed by a contextual user prompt. This sequence is preserved in a conversation array, simulating a realistic dialogue flow with a persona-aware assistant. See Listing 4.2

```
conversation = [
    {"role": "user", "content": prompt},
    {"role": "assistant", "content": persona_response},
    {"role": "user", "content": prompt2}
]
```

Listing 4.2: Multi-turn conversation example

## Prompt Evaluation and Feedback Mechanism

To support reflective learning, the platform provides an automatic evaluation of user-submitted summaries. Each lesson includes an evaluation endpoint (e.g., `/api/evaluate-summary-1`, `/api/evaluate-summary-2`), which compares the student's summary with embedded lesson content. An evaluation prompt is constructed and sent to the model asking it to rate the summary's accuracy and provide feedback in a structured JSON format. See Listing 4.3

```
prompt = f"""
Evaluate if the student's summary accurately covers the key takeaways of
the lesson.

**Lesson Content:**
{lesson_content}
```

```

**Student's Summary:**
{user_summary}

Please provide the evaluation strictly in the following JSON format:
{
  "evaluation": {
    "is_accurate": true or false,
    "feedback": "Brief explanation of strengths and areas for improvement
                ."
  }
}
"""

```

Listing 4.3: Evaluation prompt structure

The JSON response is parsed and returned to the frontend as structured feedback to inform users whether their understanding is accurate, guiding their self-assessment and improvement.

### Prompt Interaction Tracking

To monitor learning engagement and progress, the backend tracks each interaction a user makes with the AI. Every time a prompt is submitted, the counter `prompts_tried` in the `user_progress` table is incremented. This allows the system to visualize and quantify user engagement. See Listing 4.4.

```

def increment_prompts_tried(user_id):
    cursor.execute("""
        UPDATE user_progress
        SET prompts_tried = prompts_tried + 1
        WHERE user_id = %s;
    """, (user_id,))

```

Listing 4.4: Incrementing prompt interaction counter

Additionally, quiz submissions are recorded with progress points and attempt counters using dedicated routes such as `/submit-quiz-0`, `/submit-quiz-1`, etc.

### AI-Powered Prompt Laboratory

The Prompt Laboratory offers a free-form experimentation space. Prompts are sent to AI alongside predefined "better" and "worse" versions. The system returns responses to all three, enabling learners to contrast the results and develop an intuition for what constitutes a strong prompt.

The route `/api/laboratory-meeting-notes` illustrates this design, where user-generated, expert-improved, and flawed prompts are all evaluated on a shared scenario (e.g., meeting notes). This comparative method helps students internalize effective prompt structures through guided discovery.

#### 4.2.4. User Progress Tracking

The Prompting School backend implements a robust tracking system to monitor user engagement, lesson progress, and prompt-based activities. This data is crucial for providing feedback, gamifying the experience, and issuing certificates upon course completion.

Progress tracking is tightly coupled with the PostgreSQL database schema, especially through the `user_progress` table. Each user's progress is tracked per lesson, and includes metrics such as quiz scores, bonus points, number of attempts, and the total number of prompts attempted.

##### Database Structure

The backend uses the `user_progress` table to store the following fields:

- `progress_points` - Score achieved by the user on quizzes.
- `bonus_points` - Additional points assigned for bonus performance (e.g., testing example prompts in lesson part).
- `attempts` - Number of quiz attempts per lesson.
- `prompts_tried` - Cumulative number of prompts submitted by the user across lessons.

This schema enables fine-grained tracking of both formal assessments (quizzes) and informal engagement (prompt experimentation).

##### Prompt Interaction Tracking

Every time a user submits a prompt-either within a lesson or in the Prompt Laboratory-the backend updates the `prompts_tried` counter for that user. This is handled by a utility function, invoked after a successful prompt submission. See Listing 4.5.

```
def increment_prompts_tried(user_id):
    query = """
    UPDATE user_progress
    SET prompts_tried = prompts_tried + 1
    WHERE user_id = %s;
    """
    cursor.execute(query, (user_id,))
```

Listing 4.5: Incrementing user's prompt usage

This metric is later used to visualize progress and issue certificates based on engagement thresholds.

## Quiz Completion and Scoring

Quiz results are submitted to the backend via dedicated API routes (e.g., `/submit-quiz-1`, `/submit-quiz-2`, etc.), each corresponding to a lesson. The backend updates the `progress_points` field for that lesson and increments the `attempts` counter. See Listing 4.6.

```
UPDATE user_progress
SET
    progress_points = %s,
    attempts = attempts + 1
WHERE
    user_id = %s AND course_id = %s AND lesson_id = %s;
```

Listing 4.6: Recording a user’s quiz result

This ensures that the system reflects the most recent quiz outcome and allows tracking of retry behavior.

## Lesson Completion and Progress Overview

Lesson completion is inferred based on the presence of a quiz score and/or prompt engagement. The endpoint `/api/user-progress` returns an overview of the user’s performance across core lessons. It aggregates scores, number of attempts, and any awarded bonus points, enabling the frontend to render progress bars or completion badges. See Listing 4.7.

```
SELECT
    up.progress_points AS score,
    up.attempts,
    up.bonus_points
FROM user_progress up
JOIN lessons l ON up.lesson_id = l.id
WHERE
    up.user_id = %s
    AND l.lesson_name IN (...)
ORDER BY up.lesson_id ASC;
```

Listing 4.7: User progress query across lessons

## Certificate Eligibility

Once the user completes all lessons (based on a combination of quiz performance and prompt engagement), they become eligible to generate a certificate. The backend checks for completed progress across all lessons and uses the stored email and progress data to generate a customized certificate.

This integration closes the loop between backend logic, learning progress, and recognition.



### Progress Overview Endpoint

The endpoint `/api/prompts-tried` retrieves the total number of prompts submitted by a given user. This is used to visualize the user's engagement throughout the course in the frontend dashboard. See Listing 4.8.

```
SELECT prompts_tried
FROM user_progress
WHERE user_id = %s;
```

Listing 4.8: Fetching prompt submission count

### 4.2.5. Conclusion

The backend architecture of Prompting School is designed to efficiently manage user interactions, and evaluate AI-generated responses. By integrating Flask, PostgreSQL, and OpenAI's ChatGPT, the system enables users to develop AI literacy through hands-on experimentation and structured learning.

## 4.3. Database: PostgreSQL Design

The backend of the Prompting School platform uses PostgreSQL as its database management system. PostgreSQL was chosen due to its reliability, scalability, and support for relational data, making it suitable for handling structured course progress, authentication, and prompt experimentation records.

The database consists of four main tables:

- Users
- Courses
- Lesson
- User\_Progress

with foreign key relationships ensuring data consistency. See Figure 4.20. The following sections describe the structure and purpose of each table.

### 4.3.1. Users Table

The users table stores authentication-related information for registered users. It includes:

- **id** (Primary Key) - A unique identifier for each user.
- **email** (Unique) - The user's email address.
- **password** - A password for secure authentication. The password is hashed in version 2 of the website.

Each user is uniquely identified by their **id**, which is referenced in other tables to track their progress and course enrollment.

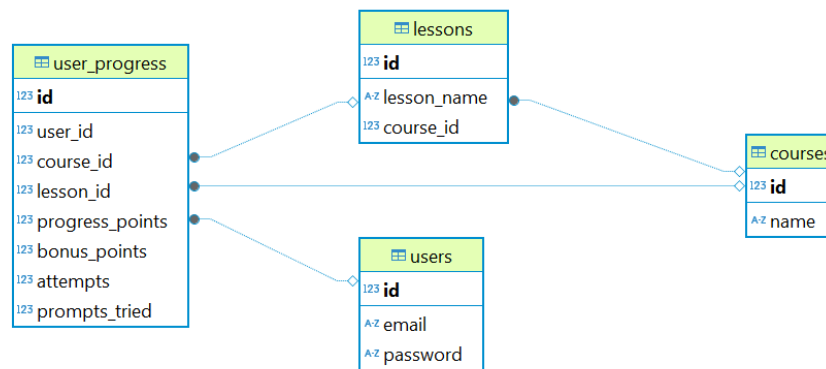


Figure 4.20.: The diagram illustrates the core structure of the application’s backend database, including tables for users, courses, lessons, and user progress. Foreign key relationships enforce referential integrity between user progress entries and the corresponding users, lessons, and courses. The ER diagram is created by DBeaver 24.3.5 which was also used as a helpful tool during development

#### 4.3.2. Courses Table

The courses table stores information about different courses available in the system:

- **id** (Primary Key) - A unique identifier for each course.
- **name** - The name of the course.

A single course consists of multiple lessons, and its **id** is referenced in the **lessons** table.

#### 4.3.3. Lessons Table

The lessons table defines individual lessons under each course:

- **id** (Primary Key) - A unique identifier for each lesson.
- **lesson\_name** - The title of the lesson.
- **course\_id** (Foreign Key) - Links the lesson to a specific course.

The foreign key **course\_id** ensures that every lesson belongs to a valid course.

#### 4.3.4. User Progress Table

The **user\_progress** table tracks each user’s progress within the platform, including lesson completion, attempts, and engagement with prompts:

- `id` (Primary Key) - A unique progress record identifier.
- `user_id` (Foreign Key) - Links to the `users` table.
- `course_id` (Foreign Key) - Links to the `courses` table.
- `lesson_id` (Foreign Key) - Links to the `lessons` table.
- `progress_points` - Tracks the user's progress based on lesson completion and quiz performance.
- `bonus_points` - Additional points awarded for extra engagement or achievements.
- `attempts` - The number of times a user has attempted a lesson or quiz.
- `prompts_tried` - The number of times a user has tested prompts in the Prompt Laboratory.

This table ensures that user engagement data is stored persistently and updated dynamically based on activity.

#### 4.3.5. Data Relationships and Integrity

The database schema follows referential integrity by ensuring that relationships between tables are maintained through foreign keys:

- Each user's progress is tied to a specific course and lesson.
- Every lesson belongs to a valid course.
- Deleting a user removes all their associated progress records.

By designing the database in this relational structure, the system ensures efficient data retrieval, structured learning progression, and data consistency across users and courses.

### 4.4. Deployment and Hosting

The deployment of the **Prompting School** platform is managed using **Render**, a cloud-based hosting provider that automates application deployment and infrastructure management. The frontend, backend, and database are hosted separately to ensure scalability and maintainability. The platform is linked to the GitHub repository at:

[https://github.com/irfanjahic/prompting\\_school](https://github.com/irfanjahic/prompting_school)

#### 4.4.1. Hosting Services on Render

Render provides a streamlined deployment process with built-in continuous integration. The architecture consists of three core services:

- **Frontend:** Hosted as a Static Site and deployed globally via Render's content delivery network (CDN). The frontend, built with Svelte, ensures fast page load times.
- **Backend:** Deployed as a Python 3 web service, running the Flask API responsible for user authentication, lesson progression, and communication with OpenAI's API.
- **Database:** Managed as a PostgreSQL 16 instance, hosted in Render's data center. This database stores user information, course data, and number of prompts by user.

The backend and database are hosted in Frankfurt, optimizing response times for European users, while the frontend is served globally for better performance.

#### 4.4.2. GitHub Integration and Continuous Deployment

Render is directly connected to the GitHub repository at

`https://github.com/irfanjahic/prompting\_school`

, enabling seamless deployment via continuous integration. The deployment workflow follows these steps:

1. The developer pushes code updates to the GitHub repository.
2. Render automatically detects changes and triggers a new deployment.
3. The frontend (Svelte) is built and deployed to the static site service.
4. The backend (Flask) is redeployed as a Python 3 service.
5. The database remains persistent, ensuring no data loss during updates.

This integration eliminates the need for manual deployment and ensures that the latest version of the application is always live.

#### 4.4.3. Domain and DNS Configuration

The domain `prompting-school.com` was purchased through Namecheap and configured to point to the deployed services. The domain setup includes:

- **Custom Domain Linking:** Render allows linking of custom domains via DNS records.

- **DNS Management:** The necessary **CNAME** and **A** records were configured in Namecheap's DNS settings to route traffic correctly.
- **Automatic SSL (HTTPS):** Render provides built-in SSL certificates, ensuring secure HTTPS connections.

#### **4.4.4. Monitoring and Scaling**

Render provides built-in monitoring tools to track service health and application performance. Key features include real-time logging, which allows developers to debug and monitor API requests; automatic scaling, enabling the backend to adjust based on traffic demands; and PostgreSQL database backups, which ensure data integrity and provide recovery options.

By leveraging Render's automated deployment features and Namecheap's domain management, the Prompting School platform ensures a reliable, secure, and scalable learning environment.



## 5. Findings and Proof-of-Concept

This chapter presents the results of the user survey conducted as part of the Prompting School proof-of-concept. The survey aimed to assess user experience, effectiveness, and potential improvements of the platform. The findings provide insights into how well the course supports AI literacy and prompt engineering skills.

The evaluation focuses on the extent to which participants improved their ability to interact with AI tools, the challenges they faced, and their suggestions for enhancing the platform. These insights will help refine the learning experience and inform further development of the Prompting School.

### 5.1. Survey Overview

A Google Forms survey was conducted with 19 participants, gathering both quantitative ratings and qualitative feedback. The survey was structured to assess:

- **User experience evaluation** - Including interface intuitiveness, ease of navigation, and engagement.
- **Effectiveness of learning** - Self-reported improvements in prompt engineering skills and AI interaction.
- **Key takeaways and learned skills** - What users found most valuable.
- **Areas for improvement** - Suggestions for enhancing the platform.
- **Future enhancements** - User recommendations for additional features and content.

Participants had varying levels of experience with AI tools, ranging from regular users to beginners, see Figure 5.1. Their responses offer a comprehensive view of how different user groups engage with the Prompting School platform.

### 5.2. Key Findings

This section presents the most relevant findings from the survey, structured into different aspects of user experience, learning effectiveness, and areas for improvement.

Have you used AI tools (e.g., ChatGPT, Copilot, Bard) before?

19 responses

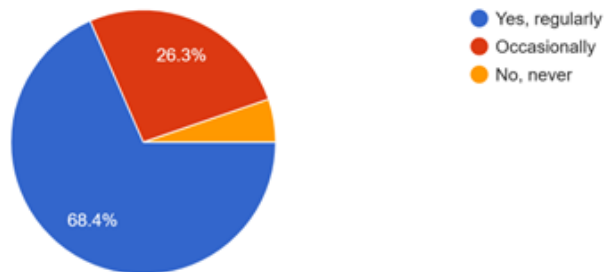


Figure 5.1.: Prior AI Experience of Participants

After completing all lessons, which skill do you feel improved the most?

19 responses

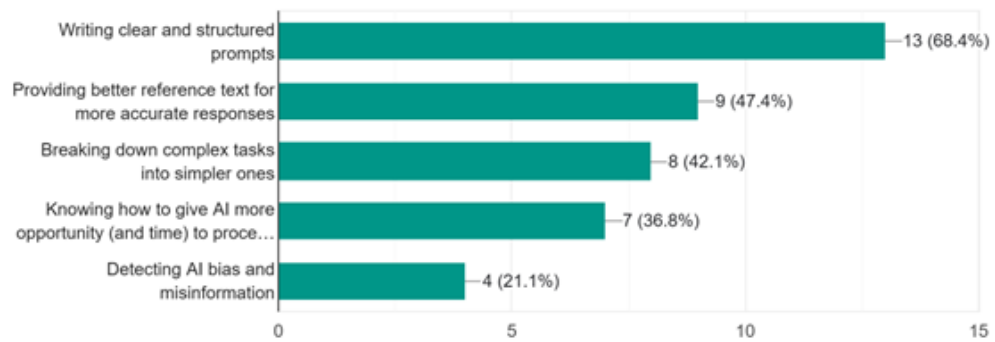


Figure 5.2.: Course Ratings by Participants



If you had to recommend one area for improvement in this course, which would it be?  
19 responses

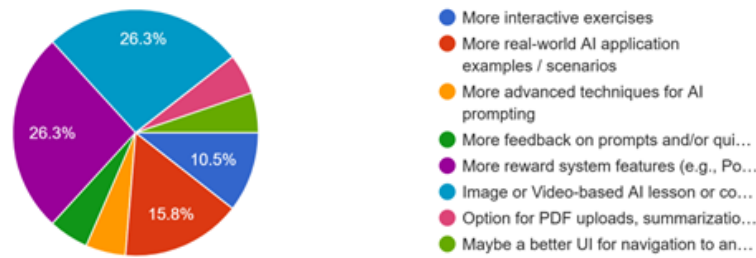


Figure 5.3.: Areas for Improvement

### 5.2.1. Improved Skills

Participants reported improvements in several key areas related to AI prompting. See Figure 5.2. The most frequently mentioned skills were:

- **Writing clear and structured prompts** - Users learned to formulate precise and effective instructions.
- **Breaking down complex tasks** - A structured approach led to better AI responses.
- **Providing better reference text for more accurate AI responses** - Participants recognized the impact of detailed reference materials on AI outputs.

These findings indicate that the Prompting School platform successfully teaches fundamental prompt engineering skills.

### 5.2.2. Areas for Improvement

Participants suggested several areas where the course could be enhanced:

- **More interactive elements** - Users requested additional hands-on exercises and real-world AI application scenarios.
- **Gamification features** - Features like points, leaderboards, and badges were suggested to increase engagement.
- **Additional content formats** - Video-based lessons and advanced AI prompting techniques were frequently mentioned.

These insights suggest that participants value a dynamic and immersive learning experience and would like the course to evolve beyond text-based lessons. See Figure 5.3.

Did the course structure (e.g., examples, exercises, quizzes) help you stay motivated and self-disciplined in learning AI prompting?

19 responses

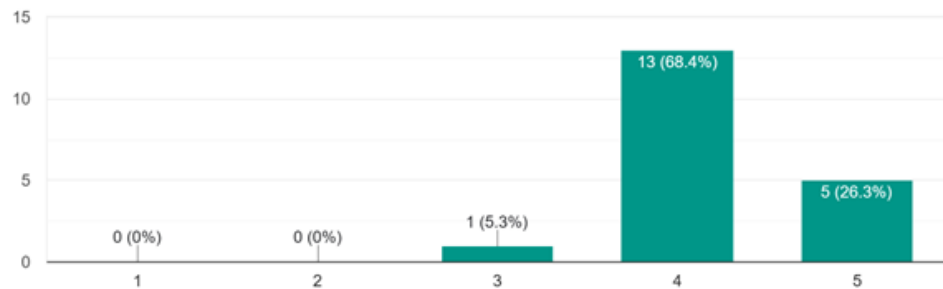


Figure 5.4.: User motivation based on course structure support (1 = not at all, 5 = very much)

### 5.2.3. User Motivation and Engagement

The majority of participants remained engaged throughout the course, but some challenges were identified:

- **Writing summaries before quizzes was challenging** - Several users found this step too strict or time-consuming.
- **Uncertainty about some prompts** - A few participants struggled with understanding the expected responses.
- **Progress tracking as motivation** - The ability to track progress and complete lessons was seen as motivating.

See Figure 5.4.

### 5.2.4. Most Effective Learning Strategies

Participants found the following strategies particularly useful in mastering AI prompting:

- **Breaking down tasks step-by-step** - Simplifying complex queries led to better AI responses.
- **Providing reference text to AI** - Users learned that well-structured reference information improves response quality.
- **Allowing the model time to "think"** - Some users experimented with prompting methods that gave AI more processing steps.

These results indicate that structured, guided learning is an effective approach for improving prompt engineering skills.

### 5.2.5. User Experience and Design Feedback

**What users liked the most:**

- The "Prompt Lab" feature
- The clear structure and explanations
- The progress tracking system

**What users disliked:**

- Some strict requirements in quiz summaries
- Limited mobile optimization
- A few repetitive sections

These findings provide valuable input for refining the platform's usability and accessibility.

## 5.3. Proof-of-Concept Validation

Based on the survey results, the Prompting School proof-of-concept has demonstrated its effectiveness in teaching fundamental AI prompting skills. The platform successfully:

- **Provided structured learning for AI prompt engineering** - Participants reported improved ability to structure and refine AI prompts effectively.
- **Helped users interact better with AI tools** - Survey results indicate that users now have a better understanding of how to craft prompts to achieve optimal AI-generated responses.
- **Offered an engaging and practical learning experience** - The course structure, including exercises and the *Prompt Lab*, was highlighted as beneficial for learning.

However, areas for further development were also identified. Key aspects that require improvement include:

- **More interactive and dynamic learning elements** - Users expressed a desire for more real-world AI applications, interactive exercises, and multimedia content.
- **Better user guidance and gamification** - Features like a reward system, leaderboard, and additional progress indicators could enhance engagement.

- **Increased mobile usability** - Some users experienced navigation difficulties on mobile devices, suggesting a need for optimization.

Overall, the survey validates the proof-of-concept while highlighting crucial areas for refinement.

## 6. Prompting School Version 2 and Teacher Workshop Evaluation

After the development of the initial version of the Prompting School platform, it was decided to make changes to the course content and to cover more aspects of UNESCO's AI Competency Framework for Students. Following initial implementation, a second version of the platform was developed in German only and is currently accessible under the domain <https://prompting.schule>. It is important to note that some of the technical aspects of this version are not fully known to me, as several changes to the frontend, backend, and database were implemented by my mentor, Benedikt Brünner. The second version is hosted on a server provided by TU Graz and under a different name. As such, this thesis focuses primarily on the concept, design, and evaluation of the initial version, while the updated version represents a continuation and evolution of the platform. The feedback collected during the workshop played a crucial role in validating the concept, uncovering usability issues, and identifying potential areas for future enhancement.

### 6.1. Motivation for Version 2

The development of Prompting School Version 2 was driven primarily by the desire to better align the platform with the UNESCO AI Competency Framework for Students. While the initial version of Prompting School introduced foundational strategies for effective prompt engineering and provided a structured, hands-on learning environment, it only partially covered the competency areas outlined in the framework.

In particular, Version 1 emphasized AI Techniques and Applications, focusing on the ability to interact meaningfully with language models through structured prompts. However, other dimensions of the framework—such as Ethics of AI, Human-Centered Mindset, and AI System Design—were either minimally addressed or not explicitly integrated into the course design.

To address this gap, an iteration of the platform was planned and implemented. The goal was to improve the overall usability of the tool and enhance its pedagogical depth, especially regarding ethical awareness, reflective use of AI systems, and the critical thinking processes involved in AI interaction.

This second iteration also aimed to prepare the platform for a workshop with practicing educators, who would provide targeted feedback on both the usability and the educational value of the platform in classroom contexts. Their input would serve as a valuable form of real-world evaluation and help assess how well the platform supports AI literacy in practice.

## 6.2. Description of Changes

To ensure that the improved version of the Prompting School aligns more closely with international standards for AI literacy, the revised content was mapped against the UNESCO AI Competency Framework for Students. This framework outlines 12 key competencies across four dimensions: Human-Centred Mindset, Ethics of AI, AI Techniques and Applications, and AI System Design. As shown in Table 6.1, Version 2 significantly expands the platform’s coverage, particularly in the areas of ethics, human agency, and responsible use. The exercises, examples, and interactive modules were specifically designed to foster not only technical skill, but also critical reflection, ethical awareness, and user accountability-core values that the framework promotes. The goal was to help learners move beyond merely understanding how prompting works and toward applying and evaluating AI usage within broader societal contexts.

Competency Area	Progression Level	Covered by Prompting School (Version 2)
<b>Human-Centred Mindset</b>	<b>Human Agency</b>	<b>Yes</b> - Lessons teach learners that they remain in control of AI, using role-based prompting and structured instruction.
	<b>Human Accountability</b>	<b>Yes</b> - Clear emphasis on user responsibility when formulating prompts and interpreting results.
	<b>Citizenship in the Era of AI</b>	<b>Yes</b> - Ethical dilemmas and critical reflection tasks introduce societal implications of AI use.
<b>Ethics of AI</b>	<b>Embodied Ethics</b>	<b>Yes</b> - Integrated ethical reference texts (e.g., human rights, proportionality, transparency) used in prompting tasks.
	<b>Safe and Responsible Use</b>	<b>Yes</b> - Addresses risks like data privacy, token understanding, and input control; encourages responsible practices.
	<b>Ethics by Design</b>	<b>Yes</b> - Users reflect on transparency, fairness, and model bias; design awareness is fostered through prompt structuring.
<b>AI Techniques and Applications</b>	<b>AI Foundations</b>	<b>Yes</b> - Concepts like tokenization, output control, and model behavior are taught in plain language.
	<b>Application Skills</b>	<b>Yes</b> - Prompt Lab exercises such as summarizing, translating, and analyzing build hands-on competence.
Continued on next page		

Table continued from previous page

Competency Area	Progression Level	Covered by Prompting School (Version 2)
	<b>Creating AI Tools</b>	<b>Partially</b> - While learners do not build tools, the use of few-shot prompts and logical task design simulates foundational thinking for tool creation.
<b>AI System Design</b>	<b>Problem Scoping</b>	<b>Yes</b> - Learners learn to break down complex tasks and define subtasks, fostering structured thinking.
	<b>Architecture Design</b>	<b>Partially</b> - Use of delimiters, markdown, and XML simulates structured input design, though without full system-level abstraction.
	<b>Iteration and Feedback Loops</b>	<b>Yes</b> - Encourages prompt refinement through repeated experimentation and observation in the Prompt Lab.

Table 6.1.: Coverage of AI Competency Framework in Prompting School Version 2

To illustrate the updated design and pedagogical improvements, Figure 6.1 shows key interface elements from the new version of the platform, including redesigned quizzes, feedback systems, and structured practice modules.

## 6.3. Workshop Setup and Participant Overview

To evaluate *Prompting School Version 2*, a workshop was organized with a group of 21 in-service teachers. The goal of this workshop was twofold: (1) to test the platform in an authentic educational context, and (2) to gather qualitative and quantitative feedback on the content, usability, and perceived relevance of the course material-especially in light of the revised alignment with the UNESCO AI Competency Framework.

### 6.3.1. Workshop Context

The workshop was conducted in Ingenium Education GmbH in Jungferngasse 1, Graz on 25th of March 2025. The session was facilitated by my mentor Benedikt Br  nner, with my humble support, since I previously contributed to development iterations of the platform. The session lasted approximately 2.5 hours and consisted of three parts:

1. **Introduction and onboarding** - Participants were introduced to Prompting School and the goals of the Prompting School.
2. **Hands-on platform exploration** - Teachers independently explored the course structure, completed lessons, quizzes and interacted with the Prompt Laboratory.

### Lektion Grammatik-Korrektur

Stell dir vor, du schreibst eine **wichtige E-Mail** an deinen Vorgesetzten, bist dir aber unsicher, ob deine Grammatik korrekt ist. Du möchtest professionell wirken, also nutzt du KI, um **deinen Text sofort zu korrigieren**, bevor du ihn versendest.

Typ	Inhalt	Einfügen
Zeilenform-Fehler	Hallo Herr Johnson,  Ich hoffe, diese E-Mail erreicht Sie gut. Ich werde Ihnen gestern geschriebenen haben und schreibe jetzt nochmal, weil ich vergessen wurde, einige Punkte zu erwähnen. Ich bespreche kurz, was wir gestern besprochen haben, und dann sende ich Ihnen noch ein paar Gedanken, die mir später eingefallen sind.  Ich denke, wir besprechen die Budgetplanung, aber ich vergesse, ob wir auch das Teammeeting eingeplant hatten. Können Sie mir sagen, wann das stattfindet?  Ich freue mich, wenn ich bald Ihre Rückmeldung erhalte.  Mit freundlichen Grüßen sehr geehrte Frau Schneider,	Einfügen
Grüß/Kleinschreibung	vielen dank für ihre rückmeldung. ich wollte sie nur kurz darüber informieren, dass die präsentation nun finalisiert ist. bitte lassen sie mich wissen, ob sie noch änderungen wünschen oder ob wir sie so verwenden können.  ich freue mich auf ihre rückmeldung.  mit freundlichen grüßen	Einfügen

**Aufgabe: Grammatik-Korrektur?**  
Die KI soll grammatikalische Fehler erkennen und den Text professionell formulieren.

- Schreibe unten ein Prompt, das einen beliebigen deutschen Text grammatikalisch korrigiert.
- Füge deinen eigenen klarstellenden Beispielsatz ein und erhalte sofort eine überarbeitete Version.

Prompt der KI (maximal 200 Zeichen)

Prompt

Antwort

### Kurs: Grundlagen für Schüler:innen

**Klare Anweisungen schreiben**

Zum Abschluss dieser Lektion benötigst du: 1★

Von dir gesammelte Sterne: 0★

Dein bester Versuch liegt bei 0%

**Referenztext bereitstellen**

Zum Abschluss dieser Lektion benötigst du: 2★

Von dir gesammelte Sterne: 0★

Dein bester Versuch liegt bei 25%

**Komplexe Aufgaben auflösen**

Zum Abschluss dieser Lektion benötigst du: 3★

Von dir gesammelte Sterne: 0★

Dein bester Versuch liegt bei 0%

**Zeit zum Nachdenken**

Zum Abschluss dieser Lektion benötigst du: 4★

Von dir gesammelte Sterne: 0★

Dein bester Versuch liegt bei 0%

Über uns

Über Prompt Engineering Chancen

Über uns

Über Prompt Engineering Chancen

Über uns

Über Prompt Engineering Chancen

(a) Prompt Lab - grammar correction interface

(b) Revised course overview with visual progress indicators

### Quiz zur Lektion Klare Anweisungen schreiben

Beantworte die Quizfragen.

**Welche der folgenden Aussagen ist ein Beispiel für eine gut strukturierte Eingabeaufforderung?**

- Wie funktioniert K2?
- Erläutere Rekursion in Python mit einem Beispiel und einer Schritt-für-Schritt-Erklärung.
- Schreibe mir etwas über Technologie.

**Was verbessert die Qualität einer KI-Antwort am meisten?**

- Zufällige Stichworte verwenden.
- Mehr Emojis einbauen.
- Alle wichtigen Details und den Kontext in der Aufgabe angeben.

**Was ist ein Vorteil der Rolle „Wissenschaftler/in“ im Prompting?**

- Die Antwort wird persönlicher.
- Der Ton wird sachlich und reflektierend.
- Die KI antwortet automatisch in Reimen.

**Welche Prompt-Abgrenzung eignet sich, um einen klaren Abschnitt zu definieren?**

- Ein Stern \*
- Dreifache Anführungszeichen ""
- <Aufgabe> ... </Aufgabe>
- # Abschnitttitel

**Welche Trennzeichen wurden in der Lektion vorgestellt?**

- "" Trennzeichen
- XML-Tags
- PDF-Seitenverweise
- Unstrukturierte Beschreibung

### Quiz

Zum Abschluss dieser Lektion benötigst du: 1★

Von dir gesammelte Sterne: 0★

Dein bester Versuch liegt bei 0%.

Quiz erneut starten

(c) Updated quiz with multiple-choice format

(d) Quiz result feedback with retry option

★ Aufgabe: Beschreibe, welche Unterschiede die Abgrenzungen im Prompt machen.

Löse diese Aufgabe, um einen Stern ★ zu erhalten!

Beachte, welche Trennzeichen die Abgrenzungen im Prompt machen.

Abgrenzungen können helfen, die Eingabe zu strukturieren und dem Modell das Verständnis der Aufgabe zu erleichtern.

Feedback besteht aus 20 Fragen und 100 Aufgabenfeldern.

Genau! Abgrenzungen sind wichtig, um Informationen klar zu strukturieren und die Kommunikation zu verbessern. Gut gemacht!

Stern erhalten ★

(e) Interactive task feedback and star reward system

Figure 6.1.: Visual overview of user interface updates and course improvements in Prompting School Version 2.



3. **Feedback collection and group discussion** - Structured feedback was gathered in person and through a digital questionnaire, followed by an open discussion round.

### **6.3.2. Participant Profile**

All 21 participants were active educators from different HTL schools across Austria and different subject areas, ranging from math teachers to informatics or software development teachers. Most of the participants already had a lot of experience with generative AI and prompting.

### **6.3.3. Data Collection Approach**

Feedback was collected through:

- A standardized feedback form (Likert-scale and open-ended items) covering usability, content clarity, perceived usefulness, and relevance to their teaching context.
- A group discussion (informal), focusing on impressions, challenges, and suggestions for further development.

Participants were also encouraged to share specific examples of prompts they found useful or confusing, allowing for more detailed insight into how the platform's content translated into practice.

## **6.4. Feedback and Key Findings**

The final component of the evaluation process consisted of a structured feedback phase conducted at the end of the workshop. 21 participants completed the course and submitted written responses through a standardized feedback form. This section summarizes the most important insights gathered, both quantitatively and qualitatively.

### **6.4.1. Quantitative Overview**

#### **Prior Experience with AI Tools**

The majority of participants had already used AI tools before the course. Figure 6.2 shows the distribution of responses regarding participants' prior use of tools such as ChatGPT, Copilot, or Bard.

#### **Perceived Improvement in the Ability to Use AI Tools (e.g., ChatGPT)**

Participants were also asked how much the course improved their ability to interact with AI tools. The results, shown in Figure 6.3, suggest only moderate improvement overall.

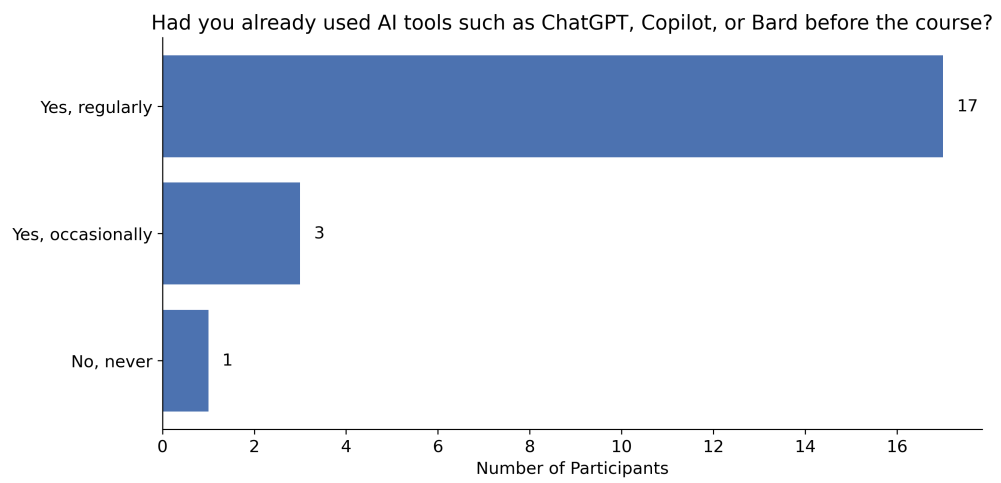


Figure 6.2.: Prior experience with AI tools before the course.

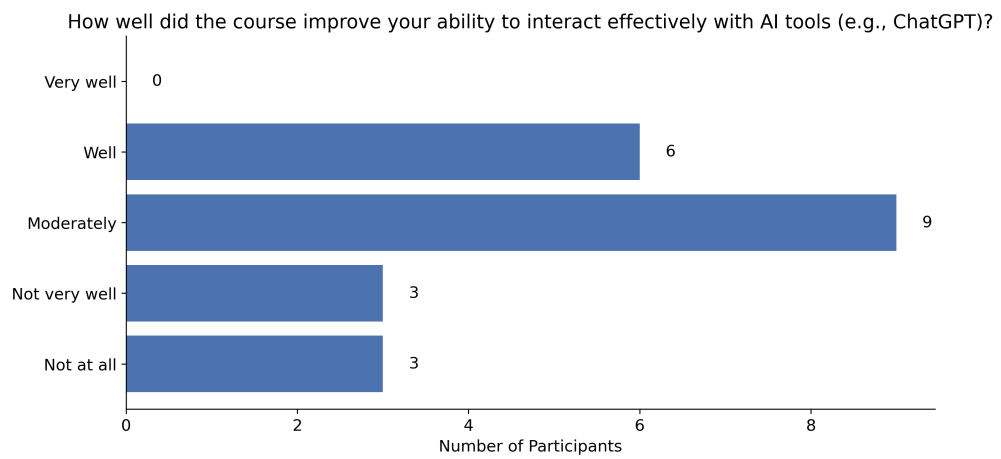


Figure 6.3.: Perceived improvement in AI tool usage after the course.

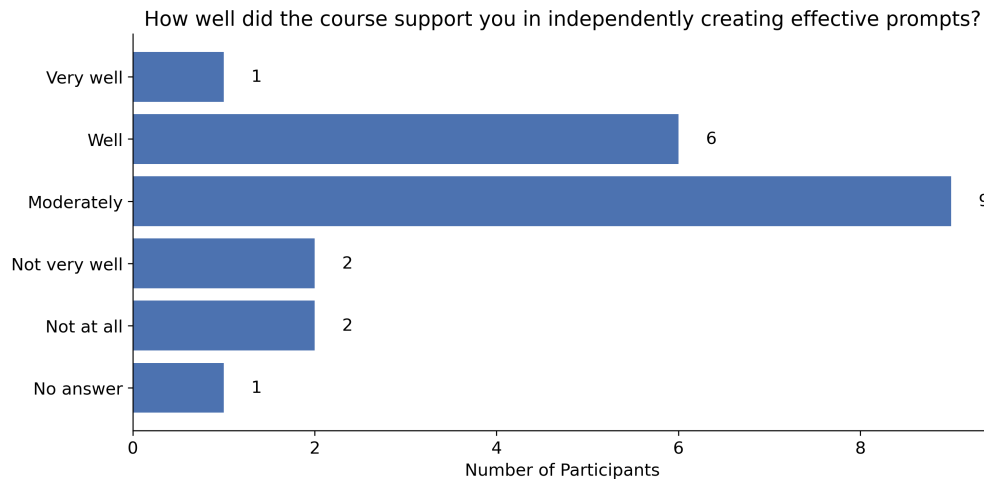


Figure 6.4.: Participant feedback on the course's support in creating effective prompts.

### Support in Creating Effective Prompts Independently

As illustrated in Figure 6.4, the course moderately supported participants in learning how to craft effective prompts independently, with a large number rating the support as "mittelmäßig".

The results show that almost all participants do indeed have a lot of experience with generative AI already, and that the course didn't have a large impact on improving their prompting skills or usage of generative AI tools.

#### 6.4.2. Qualitative Feedback

##### Most Improved Abilities (Self-Reported)

Participants reported improvements primarily in the following areas:

- Writing clearer prompts (*Klare Prompts schreiben*)
- Better structuring of input and understanding task framing
- Critical reflection on the appropriate use of generative AI tools

##### Free-Text Feedback - Key Themes

- Some participants expressed that they found the course insightful, especially regarding prompt clarity and the ethical boundaries of AI use.
- One participant mentioned that their prompts had previously lacked context, and they became more aware of how to frame them effectively.

- Critical voices included comments about the course being “eher langweilig” (rather boring) or not adding much value for those already experienced in teaching prompt design.
- A few respondents stated “keine” (none) in the open-ended fields, either signaling satisfaction or limited engagement with the feedback section.

### **6.4.3. Interpretation and Outlook**

The results highlight the importance of tailoring AI literacy content to varying levels of prior experience. While the platform successfully improved understanding for many, especially in structuring prompts and reflecting on AI use, future iterations could offer differentiated pathways for advanced users. In summary, the workshop validated the overall value of the platform and revealed useful areas for further refinement.

## 7. Discussion

### 7.1. Summary of Key Findings

The development of Prompting School resulted in a functional, web-based learning platform designed to teach foundational strategies in prompt engineering. The course content draws from OpenAI's official prompt engineering strategies and provides a structured, hands-on learning experience. It was complemented by self-assessment quizzes and a Prompt Laboratory that allows users to test and refine real-world examples. Although not explicitly designed to implement the UNESCO AI Competency Framework for Students, Prompting School aligns with many of its educational goals, particularly those related to AI application skills, human agency, and iterative AI interaction.

Additionally, two small-scale proof-of-concept evaluations were conducted, providing preliminary insights into learners' perceived improvement in prompt engineering skills. Participants appreciated the interactive nature of the lessons and expressed interest in expanding the course with more strategies and real-world examples.

### 7.2. Interpretation in Light of Theory

As discussed in the theoretical background, the concept of literacy has evolved significantly in the digital age, expanding from traditional forms to digital literacy, AI literacy, and now prompt literacy. Prompt engineering, as presented in Prompting School, represents a practical manifestation of AI literacy and aligns with the competencies identified in frameworks such as UNESCO's. Specifically, the course enables learners to actively engage with AI systems, thereby supporting human-centred agency, critical reflection, and responsible use. It also encourages iteration and experimentation, core elements of the "AI System Design" competency area. By situating prompt literacy within this evolving hierarchy of literacies, the project contributes to both conceptual clarity and pedagogical innovation.

Furthermore, Prompting School integrates theoretical concepts from digital competence frameworks (e.g., DigComp 2.2) and 21st-century skills. These are reflected in the platform's emphasis on communication, creativity, critical thinking, and problem-solving in interaction with AI systems.

### 7.3. Contribution of the Work

This thesis contributes to the emerging discourse on generative AI in education by translating theoretical AI literacy concepts into a concrete, user-friendly learning experience.

Unlike many existing AI education platforms that focus either on theoretical understanding or advanced development, Prompting School targets end-users—those who interact with generative AI systems without a background in programming or data science. By doing so, it fills a notable gap between high-level AI research and the real-world competencies users need. The platform makes prompt engineering accessible, interactive, and ethically reflective, providing a solid foundation for AI literacy in practical contexts.

Another key contribution is the potential for scalability and adaptability of the platform. Its modular design allows educators or institutions to add new content or translate materials, thereby increasing its value as a reusable and expandable educational tool.

The development of Version 2 of Prompting School and its subsequent evaluation through a teacher workshop significantly strengthened the platform’s practical relevance and alignment with international AI literacy standards. The feedback collected from 21 in-service educators highlighted both the usability and pedagogical robustness of the improved course structure. Compared to the initial proof-of-concept, Version 2 introduced explicit coverage of ethical prompting, role-based interaction, and reflection tasks—allowing the platform to address all 12 dimensions of the UNESCO AI Competency Framework. These results confirm that iterative user-centered design can effectively enhance AI education tools in a short time frame.

## **7.4. Strengths of the Platform**

One of the major strengths of Prompting School is its modular and extensible design. The structure allows for the easy integration of additional lessons and quizzes, making it adaptable to a variety of learning needs and audiences. The alignment with OpenAI’s prompt engineering guide ensures that the content is technically sound and immediately relevant. The inclusion of the Prompt Laboratory enables learners to receive real-time feedback and learn through trial and error, supporting active learning. Furthermore, the course is designed to require no prior knowledge of AI, coding, or data science, making it widely accessible. Its visual clarity, structured progression, and self-assessment features contribute to its effectiveness as a learning platform.

Another notable strength is the platform’s balance between structured instruction and open-ended experimentation. Learners are first introduced to foundational knowledge and then encouraged to apply that knowledge creatively in realistic scenarios.

## **7.5. Limitations**

Despite its strengths, Prompting School has several limitations. First, the platform has not yet undergone formal large-scale user testing or empirical evaluation. Therefore, claims about its educational effectiveness remain preliminary. Second, the scope of the course is limited to the first four strategies from OpenAI’s prompt engineering guide. Although these provide a solid foundation, more advanced tactics could be included in future iterations. Third, while the course touches on responsible and ethical AI use, these themes are not deeply embedded in the current structure. Topics such as bias,

data privacy, and misuse of generative AI tools are only briefly mentioned, and deserve more comprehensive treatment. Lastly, the platform currently supports only English and German, limiting accessibility.

From a technical standpoint, aspects such as scalability under high traffic, accessibility compliance (e.g., WCAG standards), and mobile responsiveness were identified as potential areas of enhancement in future iterations.

## **7.6. Reflections**

The development of Prompting School highlighted the interdisciplinary nature of prompt engineering. It is not merely a technical task but also a cognitive and communicative one, involving clarity of thought, creativity, and critical thinking. During development, the importance of ethical awareness in prompt construction became increasingly apparent. For example, the design of prompts can subtly influence the biases and outcomes produced by language models. Thus, teaching users not only how to write effective prompts but also how to reflect on their implications is crucial. This reflection reinforces the need to embed ethical considerations more deeply into future iterations of the platform.

Additionally, this project underlined the importance of providing learners with immediate, authentic feedback. The Prompt Laboratory proved especially effective in engaging users through experimentation and providing space to fail safely and learn iteratively—a core principle of adult learning.

## **7.7. Technical Implementation**

The technical implementation of Prompting School was realized using modern web development technologies to ensure maintainability, interactivity, and scalability. The frontend was developed using the Svelte framework, allowing for fast, component-based rendering and smooth user interaction. The user interface was designed with clarity and accessibility in mind.

The platform integrates the OpenAI API to power the Prompt Laboratory, enabling real-time prompt-response interactions. This feature allows users to submit their own prompts, receive feedback from a language model, and compare variations in prompt formulation. The logic for prompt submission and evaluation is encapsulated in a backend service built with Python, which handles API communication and protects API keys from client exposure.

## **7.8. Recommendations for Future Work**

Future development of Prompting School could focus on several areas. First, formal user testing should be conducted to evaluate learning outcomes, user satisfaction, and areas for improvement. Second, new modules could be developed to cover topics such as ethical prompting, bias awareness, data privacy, and culturally sensitive communication. Third, the Prompt Laboratory could be expanded with domain-specific scenarios, such

as legal, educational, or medical prompting tasks. Fourth, tracking features could be added to monitor learner progress and provide feedback over time. Finally, the course could be translated into other languages to increase accessibility and broaden its global reach.

Integration of gamification elements (e.g., badges, levels, achievements) could further enhance user motivation and engagement.

In summary, Prompting School represents a timely and practical response to the growing need for AI literacy in the age of generative AI. While still in early stages, it has strong potential to contribute to the development of critical and reflective prompt users, and serves as a foundation for future educational innovation in this domain.



## 8. Conclusion

This thesis explored the concept, design, and development of Prompting School—a web-based educational platform dedicated to teaching the emerging skill of prompt engineering. In response to the increasing integration of generative AI into education, work, and everyday life, the project positions prompt literacy as a vital component of modern AI literacy.

Through a combination of theoretical grounding and hands-on implementation, the platform bridges the gap between high-level AI frameworks (such as UNESCO’s AI Competency Framework for Students) and real-world user needs. Drawing from the OpenAI prompt engineering guide, the course offers structured lessons, scenario-based quizzes, and an interactive Prompt Laboratory that fosters experimentation and critical reflection.

The development process and initial evaluation demonstrated that even users without prior AI experience can engage effectively with generative AI tools—provided that they are given the right strategies, practice environment, and learning structure. The project contributes to the evolving field of AI literacy by translating abstract competencies into a user-focused, accessible learning experience.

While the platform’s scope is currently limited to foundational prompting strategies and lacks comprehensive evaluation, its modular architecture, strong alignment with digital competence frameworks, and openness to future expansion make it a promising foundation. Future work can explore the integration of adaptive learning, ethical education modules, and deployment in formal learning environments.

The second version of Prompting School, tested through a structured teacher workshop, further validated the concept and revealed additional insights. The alignment with the UNESCO AI Competency Framework was significantly improved in Version 2, as demonstrated through the extended content and interactive exercises. These results strengthen the thesis contribution and highlight its relevance across different educational audiences.

In conclusion, Prompting School is not only a response to the rise of generative AI—it is also a proposal for how we might teach users to engage with AI tools critically, creatively, and responsibly. It supports the broader goal of enabling self-determined and ethically reflective interaction with AI, which will be increasingly essential in shaping inclusive and human-centred digital futures.



## **A. First Survey for Prompting School Proof-of-Concept**

To evaluate the effectiveness of the Prompting School prototype, a short online survey was conducted. The survey was shared with test users after they completed the course.

### **1. Have you used AI tools (e.g., ChatGPT, Copilot, Bard) before?**

- Yes, regularly
- Occasionally
- No, never

### **2. How intuitive was the course interface? (Scale 1–5)**

- Not intuitive at all (1)
- 2
- 3
- 4
- Very intuitive (5)

### **3. How well did the course improve your ability to interact with AI tools like ChatGPT? (Scale 1–5)**

- No improvement (1)
- 2
- 3

- 4
- Significant improvement (5)

**4. After completing all lessons, which skill do you feel improved the most?**

- Writing clear and structured prompts
- Providing better reference text
- Breaking down complex tasks
- Giving AI more time to process and think
- Detecting AI bias and misinformation
- Other: \_\_\_\_\_

**5. If you had to recommend one area for improvement in this course, which would it be?**

- More interactive exercises
- More real-world application examples
- More advanced prompting techniques
- More feedback on prompts or quizzes
- More reward system features (points, stats, leaderboard)
- Image or video-based AI lessons
- Option for PDF uploads/summarization
- Other: \_\_\_\_\_

**6. What is the most important takeaway from this course you would share with a colleague?**

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**7. How often did you set learning goals before starting a lesson?**

- Always
- Often
- Sometimes
- Rarely
- Never

**8. Did the course structure (e.g., examples, exercises, quizzes) help you stay motivated? (Scale 1–5)**

- Not at all (1)
- 2
- 3
- 4
- Very much (5)

**9. How well did the course support you in becoming more independent in designing effective AI prompts? (Scale 1–5)**

- No improvement (1)
- 2
- 3

- 4
- Significant improvement (5)

**10. What strategies did you find most effective in mastering AI prompting?**

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**11. Was there a point where you felt unmotivated or struggled to continue? What would have helped?**

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**12. What did you like the most about the website or course?**

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**13. What did you dislike the most about the website or course?**

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**14. Do you have any suggestions to improve the platform?**

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**15. Did you struggle with any lesson, example, or quiz? If so, which one and why?**

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## **B. Second Survey for Prompting School Proof-of-Concept**

The following questionnaire was used during the Prompting School teacher workshop. The survey was hosted on TU Graz's LimeSurvey platform and gathered feedback on prior AI use, course experience, and suggestions for improvement.

### **1. Hatten Sie vor dem Kurs bereits KI-Tools wie ChatGPT, Copilot oder Bard genutzt?**

- Ja, regelmäßig
- Ja, gelegentlich
- Nein, noch nie
- Keine Antwort

### **2. Wie gut hat der Kurs Ihre Fähigkeit verbessert, effektiv mit KI-Tools (z. B. ChatGPT) zu interagieren?**

- Sehr gut
- Gut
- Mittelmäßig
- Weniger gut
- Gar nicht
- Keine Antwort

**3. Welche Fähigkeit im Umgang mit KI-Tools hat sich Ihrer Meinung nach am meisten verbessert?**

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**4. Welche Strategie oder Herangehensweise hat Ihnen beim Erlernen von KI-Prompting am meisten geholfen?**

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**5. Wie oft haben Sie sich vor einer Lerneinheit ein konkretes Lernziel gesetzt?**

- Immer
- Häufig
- Manchmal
- Selten
- Nie
- Keine Antwort

**6. Wie gut hat Sie der Kurs dabei unterstützt, selbstständig wirkungsvolle Prompts zu erstellen?**

- Sehr gut
- Gut
- Mittelmäßig
- Weniger gut
- Gar nicht

- Keine Antwort

**7. Was war Ihrer Meinung nach die wichtigste Erkenntnis oder das zentrale “Aha-Erlebnis” aus dem Kurs?**

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**8. Gab es einen Moment, in dem Sie unmotiviert waren oder Schwierigkeiten hatten, weiterzulernen? Falls ja, was hätte Ihnen geholfen?**

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**9. Was hat Ihnen an der Plattform oder dem Kurs am besten gefallen?**

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**10. Was hat Ihnen an der Plattform oder dem Kurs am wenigsten gefallen?**

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**11. Haben Sie konkrete Verbesserungsvorschläge für den Kurs oder die Plattform?**

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**12. Gab es eine Lerneinheit, ein Beispiel oder ein Quiz, das Ihnen besonders schmergefallen ist? Wenn ja, welches?**

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**13. Wenn Sie einen Aspekt des Kurses verbessern könnten, welcher wäre das?**

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