

НОВІТНІ ТЕХНОЛОГІЇ НАВЧАННЯ У ВИЩІЙ ШКОЛІ

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EXPERIENCE OF USING THE PERPLEXITY AI-POWERED ANSWERING SYSTEM FOR EDUCATIONAL CONTENT GENERATION

Розроблення навчальних матеріалів для курсів, що викладають у закладах вищої освіти, є трудомістким процесом, який займає значну частину часу викладачів. Зі стрімким розвитком інструментів генерації тексту за допомогою штучного інтелекту у викладачів з'явилася можливість підвищити ефективність і прискорити цей процес.

Метою дослідження є аналіз можливостей і особливостей вебпошукової системи, побудованої на великій мовній моделі Perplexity AI, задля створення теоретичного матеріалу до лекцій і тестових завдань за цим матеріалом.

У межах дослідження реалізовано такі завдання: визначення функціональних можливостей і особливостей Perplexity AI, описаних дослідниками цього інструменту в наукових публікаціях; аналіз можливостей Perplexity AI щодо створення освітнього контенту, зокрема теоретичного матеріалу до лекцій та тестових завдань до нього.

У дослідженні застосовано метод огляду літератури та метод якісного аналізу відповідей, згенерованих Perplexity AI. За допомогою методу огляду літератури, проведеного на основі пошуку у двох базах даних – Scopus і Web of Science, здійснено аналіз новітніх досліджень і публікацій з метою визначення можливостей і характеристик Perplexity AI. У результаті проаналізовано переваги та недоліки цього інструменту в контексті генерації тексту та надання відповідей на запити користувачів.

Метод якісного аналізу відповідей Perplexity AI був використаний для отримання практичних результатів на основі досвіду створення освітнього контенту. У рамках дослідження автори розробили навчальний контент за допомогою Perplexity AI, що містив 8 лекцій із курсу «Імерсивні технології» й тестові завдання до згенерованого теоретичного матеріалу. Надалі було проведено аналіз релевантності, точності, сучасності й інформативності матеріалів на основі наданих першоджерел.

Після використання Perplexity AI для створення освітнього контенту зроблено висновок, що якість розробленого лекційного матеріалу та тестових завдань є задовільною за умови правильної й деталізованої побудови запитів із використанням підказок і джерел, що надаються Perplexity AI.

Ключові слова: генеративний штучний інтелект, Perplexity, освітній контент, вища освіта, лекторій, тестові завдання, мовні моделі, інструменти штучного інтелекту.

Problem statement. Artificial intelligence technologies appeared in the last century with the publication in 1943 of the work Warren Sturgis McCulloch and Walter Harry Pitts “A Logical Calculus of the Ideas Immanent in Nervous Activity,” in which a model of neural networks capable of performing logical operations was proposed [Benítez Rojas, 2024]. Subsequently, these technologies survived several so-called “artificial intelligence winters” (in the late 1970s and late 1980s), when funding was reduced and interest in AI technologies decreased due to unrealistic expectations and limited progress [Kaul et al., 2020], and it also took off when new AI technologies appeared (expert systems, machine learning, deep neural networks, deep reinforcement learning). In the 21st century, the advent of sensors, big data, advanced algorithms, and large computing power has led to the development of more complex AI systems, including generative AI and large language models, leading to a new evolutionary stage: AI 2.0. Y. Pan considers AI 2.0 a new stage of AI research that “will integrate natural intelligence and artificial intelligence in order to enhance human intellectual activity, and will be closely integrated into human life (cross-media and autonomous systems) to the point of being a part of the human body (hybrid-augmented intelligence)” [Pan, 2016].

The appearance of AI chatbot GPT-3.5 in public access in 2022 and its success and interest in its capabilities of a wide range of the public [Duarte, 2025] prompted other IT companies to similar developments. Subsequently, Perplexity AI (2022), Google Bard (2023), currently called Gemini, Bing Chat (2023), currently Microsoft Copilot, Grok (2023, stable version in 2025), DeepSeek (2025), Le Chat (2025), etc. appeared. Demand and competition have led to the emergence of a variety of generative AI tools.

Wide public attention to generative AI tools, supported by mass media, could not fail to attract the attention of educators. The possibilities described by the developers excited the imagination and prompted educators to research generative AI tools with the aim of using them for educational purposes. If we analyse the number of riddles of the main AI chats in the media (Fig. 1) and the database of scientific articles Scopus (Fig. 2) and Web of Science (Fig. 3), the most reports and scientific studies concern the use of Chat GPT and Gemini.

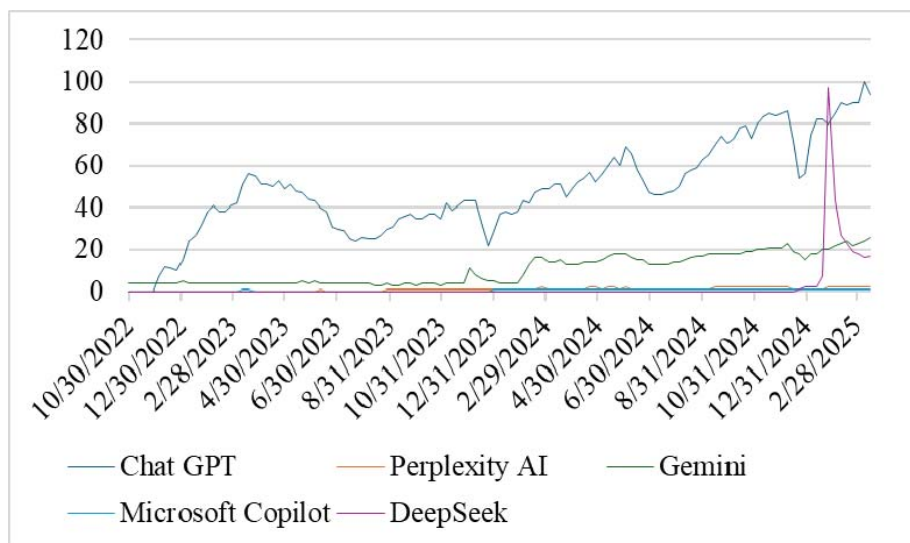


Fig. 1. Popularity of famous AI chats worldwide for the period from November 1, 2022 to March 20, 2025

Source: <https://trends.google.com/trends/explore?date=2022-11-01%202025-03-20&q=Chat%20GPT,Perplexity%20AI,Gemini,Microsoft%20Copilot,DeepSeek&hl=en>

It is worth noting that the number of mentions of AI chats in scientific articles in the Scopus database depends on the emergence of AI chat and its opening to the general public, as well as popularity among researchers. For example, Chat GPT may have more mentions due to its early popularization and wide application in various fields of science.

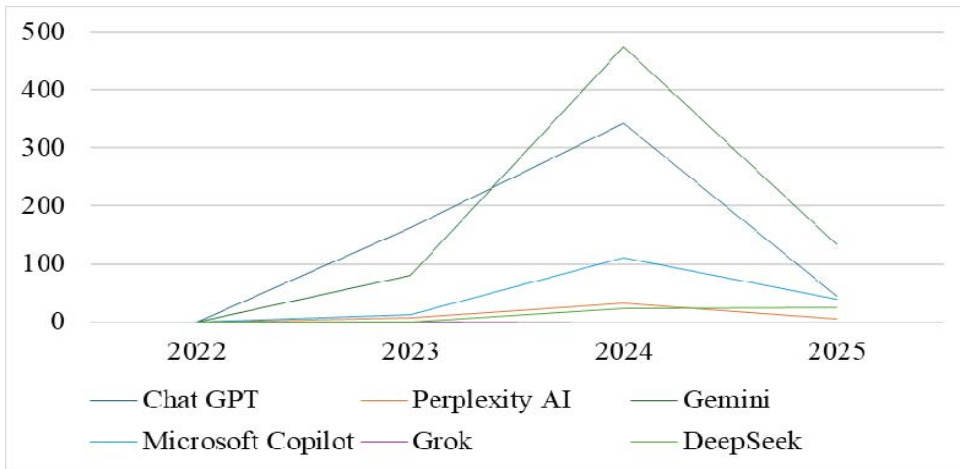


Fig. 2. Number of documents in Scopus that mention known AI chats

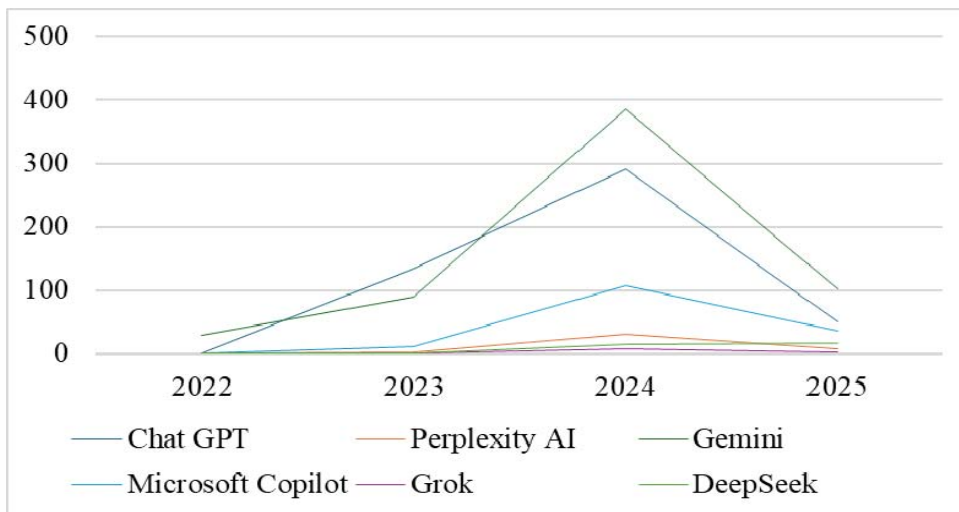


Fig. 3. The number of documents in the Web of Science that mention known AI chats

A study conducted by the marketing company First Page Sage [Bailyn, 2025], whose team collected data on the market share of each of the main generative artificial intelligence chatbots in the US as of March 6, 2025, also proves that ChatGPT ranks first. However, according to the results of the research [Bailyn, 2025], after ChatGPT, Microsoft Copilot, Google Gemini, Perplexity AI is the fourth in the market share of AI chats. In addition, its estimated quarterly user growth will be 10%, which is higher than these chats.

Considering the above, Researching the possibilities of AI chat Perplexity AI seems relevant to us today, and therefore we posed the following research questions:

Q1. What capabilities and features of Perplexity AI are identified by the researchers of this tool?

Q2. What are the uses of Perplexity AI to develop educational content, in particular theoretical material for lectures, and what will be the results of this?

Q3. How can Perplexity AI be used to develop test questions for the generated theoretical material and will the result be satisfactory?

Analysis of the latest research and publications. In the Scopus and Web of Science scientific databases, we found 45 and 41 articles, respectively, in which the search query

“Perplexity AI” was mentioned. After removing duplicates, we were left with 66 articles for analysis, of which 23 had full text in the open access. So, we analysed these articles. They can be grouped by several topics:

- 1) research on Perplexity AI search capabilities [Qian & Wu, 2023];
- 2) assessment of the accuracy, readability, performance, relevance, clarity, and completeness, and stability of the answers given by chatbots of Perplexity AI [Bir Yücel et al., 2024; Carlson et al., 2024; Gotta et al., 2024; Halawani et al., 2024; Podder et al., 2024; Saner et al., 2024; Uppalapati & Nag, 2024];
- 3) study of a potential in enhancing spam detection with Perplexity AI [Chataut et al., 2024];
- 4) determination of the information capabilities of Perplexity AI required for the efficient use of Generative AI technologies for information requirements of an academic-scientific nature [da Trindade & de Oliveira, 2024];
- 5) research on the possibilities of Perplexity AI as an effective resource for recommendations in the field of medicine [Huo et al., 2024; Naseri et al., 2024; Podder et al., 2024];
- 6) a subtle assessment of Perplexity AI hallucinations as one of the models of GPT [McIntosh et al., 2024; Vu et al., 2024];
- 7) analysis of the possibility of Perplexity AI for helping the voice care teams determine the perceptual level of dysphonia [Saeedi & Aghajanzadeh, 2024];
- 8) study of current methods for citation or attribution of Perplexity AI [Tilwaniet et al., 2024];
- 9) determination of the effectiveness of artificial intelligence in specialized sourcing and academic writing, and locating information within documents [Pizarro, 2024], making literature reviews using Perplexity AI [Utami et al., 2024].

After a detailed analysis, reading the full-text versions of the articles, it turned out that 4 articles do not correspond to the research question about what capabilities and features of Perplexity AI are defined by the researchers of this tool (Q1). Based on the articles of others, we identified the capabilities and features of Perplexity AI, which were researched by scientists. It should be noted that not all the articles contained such information. However, we managed to identify some features of this AI chat. In particular, M. Qian and H. Wu note that Perplexity AI can provide both answers and highly relevant references from the Internet, provides good answers, reference sources, related questions, and allows the user to ask follow-up questions. Since the Perplexity AI combines the benefits of large language models and a large-scale search engine, it performs well on general-purpose knowledge and reasoning, and fact-based knowledge [Qian & Wu, 2023]. Comparing ChatGPT-4, Google Bard (Gemini) and Chatsonic, scientists B. Yücel et al. [Yücel et al., 2024] positively note the readability and the stability of the responses by Perplexity AI, and at the same time emphasize the lowest accuracy of this AI chat. In comparison with ChatGPT, Microsoft Bing, Anthropic Claude and Google Bard, other scientists [Carlson et al., 2024] note the low accuracy and readability of Perplexity AI responses. [Huo et al., 2024] also note the low accuracy and effectiveness of Perplexity AI answers in the field of medicine. Scientists also note the model’s inconsistent performance across categories, lower resistance to hallucinations [McIntosh et al., 2024], and partial use of unreliable sources for citations such as blog posts or unreliable sources, which limits overall reliability of answers [Tilwaniet et al., 2024]. [Gotta et al., 2024] notes the low performance of Perplexity AI in questions about radiology examinations, and [Halawani et al., 2024] notes the insufficient readability of Perplexity AI.

However, the results of the study by [da Trindade, & de Oliveira, 2024] prove that Perplexity AI compared to ChatGPT presents a more reliable answer with relevant data and information, synthesizes more reliable and consistent answers / texts, and offers more search capabilities. Instead, I. Podder talks about the relatively more aligned performance between these two chatbots [Podder et al., 2024]. A. Naseri notes that Perplexity AI focuses on clarity and efficiency of responses [Naseri et al., 2024]. R. Chataut et al. notes that the architecture of Perplexity AI is adept at managing lengthy conversations and texts without a defined token constraint, and that adaptability enables Perplexity AI to sustain context across prolonged interactions, rendering it highly suitable for various natural language processing tasks [Chataut et al., 2024].

Therefore, it can be concluded that the vast majority of research on the use of Perplexity AI was conducted in the field of medicine [Saeedi & Aghajanzadeh, 2024; Uppalapati & Nag, 2024; Saner et al., 2024]. In the field of higher education, such studies are not enough, as [Ghapanchi & Purarjomandlangrudi, 2023] also point out, emphasizing that “there is huge uncertainty around what Generative Artificial Intelligence mean for universities in terms of assessments”. This prompted us to explore the possibilities of Perplexity AI for higher education tasks.

Formulation of the purposes of the article. The development of educational content, in particular theoretical material for lectures in higher education institutions, and test tasks for control is a time-consuming process. Research suggests that the time it takes teachers to develop effective instructional materials may differ between online and face-to-face learning environments, with online courses often requiring more preparation time due to the need for additional resources and technology integration [Freeman, 2015]. Based on the practical need for teachers of higher education institutions to optimize the process of developing educational content, the **purpose** of the study consists in analysing the possibilities and features of Perplexity AI for the development of theoretical material for lectures and test questions for the generated theoretical material.

Research methods. In order to find answers to the research questions and achieve the defined goal of the research, we used the literature review method and the method of qualitative analysis of Perplexity AI answers. Using the literature review method, we performed an analysis of the latest research and publications, and also answered the first research question about the capabilities and features of Perplexity AI, which are defined by the researchers of this tool. To do this, we searched Scopus and Web of Science for the search term “Perplexity AI”. Then we applied the criteria for inclusion and exclusion of articles from the literature review (See Table 1).

Table 1

Criteria for inclusion and exclusion of articles from the literature review

Inclusion criteria	Inclusion and exclusion criteria
The presence of the search term “Perplexity AI” in the title, abstract, keywords	Absence of the search term “Perplexity AI” in the title, abstract, keywords, or the article does not have an answer to the research question
Articles published in the period from 2022 to 2025 inclusive	Articles published until 2022
Articles, the full text of which is available	Articles whose full text is not available
	Duplicates

The results of the search in both databases, in which 66 articles were found (Scopus – 45, Web of Science – 41), were imported into the EndNote application, where duplicates were removed and the full-text versions of the articles were searched. As a result, 19 articles were analysed, because in 4 articles the answer to the posed research question was not found, as the content of the articles was not related to the analysis of AI chats at all (See Fig. 4).

To answer research questions Q2 and Q3, we applied the method of qualitative analysis of Perplexity AI answers. For this, we used chat requests for the purpose of generating educational content, in particular, theoretical material for lectures, and developing test questions for the generated theoretical material. The results of Perplexity AI’s analysis of the responses are presented below.

Presentation of basic material. Perplexity.ai is a novel conversational search engine combining OpenAI’s GPT language modelling technology and a large Internet search engine – Microsoft Bing [Qian & Wu, 2023]. Perplexity AI, designed to handle extensive volumes of information, are trained using large-scale datasets sourced from the internet and leverage advanced natural language processing (NLP) techniques to answer queries effectively [Halawani et al., 2024].

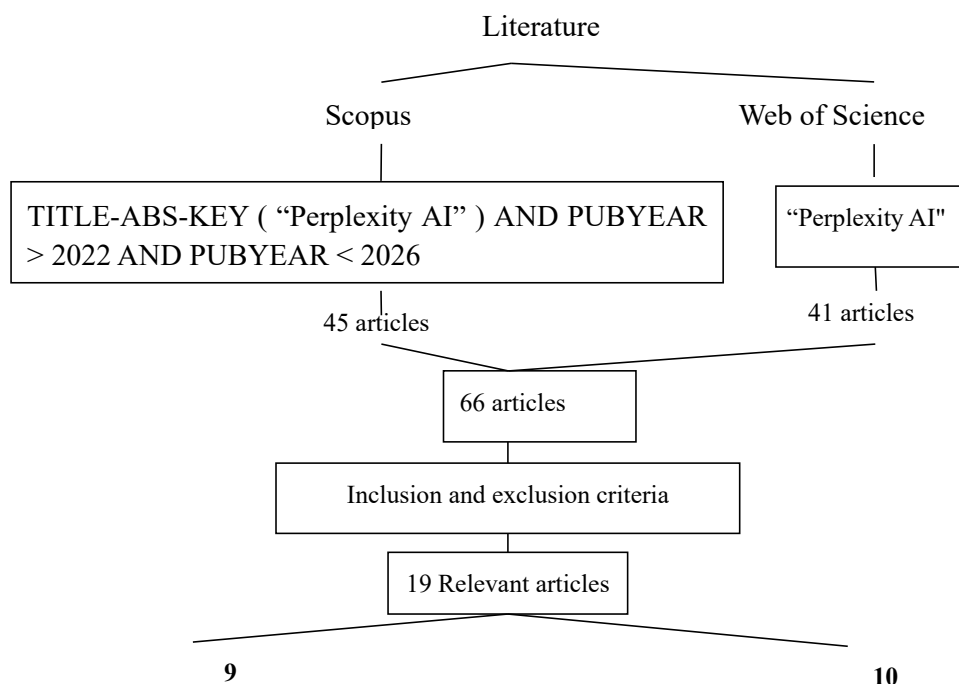


Fig. 4. Literature review scheme: the results of searching for scientific publications in Scopus and Web of Science

Perplexity AI, leveraging GPTs such as OpenAI’s GPT-3.5 and Microsoft’s Bing search engine, presents an innovative approach by providing conversational search capabilities [McIntosh et al., 2024]. The free version of Perplexity AI allows you to do unlimited basic searches even without registration. Registration allows you to save search history (Library), customize the platform interface and use advanced tools for team collaboration (Spaces). Perplexity AI’s free plan includes LLM model selection for an advanced Deep Research query (limited to 3 queries), setting search sources, and a document download feature. The Pro plan provides access to features such as more powerful AI functionality, image uploads, and hundreds of queries using Pro Search and Reasoning [Gomez, 2025]. Currently (April 2025), the following LLM models are available for selection in Perplexity AI: 1) Best – selects the best model for each query; 2) Sonar – Perplexity’s fast model; 3) Claude 3.7 Sonnet – Anthropic’s advanced model; 4) GPT-4o – OpenAI’s versatile model; 5) Gemini 2.0 Flash – Google’s fast model; 6) Grok-2 – xAI’s latest model; 7) R1 1776 – Perplexity’s unbiased reasoning model; 8) o3-mini – OpenAI’s reasoning model; 9) Claude 3.7 Sonnet Thinking – Anthropic’s reasoning model. The developers suggest choosing the LLM model depending on the search goals: Sonar, GPT-4o, Claude 3.7 or Gemini Flash 2.0 – for detailed answers with a large number of sources; R1, o3-mini or Claude 3.7 – for complex analytical questions that require several search steps [Gomez, 2025]. Deep Research mode automatically selects the optimal combination of models for in-depth research on complex topics. Auto Mode is used for fast searching, intelligently selecting the most suitable model based on the type of user request.

As a search source, you can set Web – searching across the entire Internet, Academic – searching academic papers, or Social – searching for information on social platforms to obtain user opinions or analyse current discussions.

In the process of working on a request, Perplexity AI can download textual files, including plain text, code, or PDFs, as well as images. This enables Perplexity AI to access the file’s contents and maintain contextual awareness for follow-up questions within that Thread. Perplexity AI can analyse short files completely. Analysing a long file, Perplexity AI extracts the most important parts to provide the most relevant response to your query [Gomez, 2024].

To explore the capabilities of Perplexity AI, we used the free version in Auto Mode. First, we made a request to generate topics for 8 lectures for university students on the course “Immersive Technologies”. In addition to topics, we asked to develop a plan for each lecture with at least 5 questions and a list of at least 10 questions for self-examination. As a result, we received such a list in one chat reply. Further, in the process of working on the development of content for each lecture, we changed some topics and questions of the lectures (See Table 2). So, in some lectures, the question has been changed (lecture 6), and in others, such as lectures 5, 7 and 8, the content has been completely changed.

Table 2

Lecture content suggested by Perplexity AI and final lecture content with changes

Perplexity AI proposal	Changes made
<i>Lecture 1: Introduction to immersive technologies</i> Definition of immersive technologies. The history of the development of immersive technologies. Types of immersive technologies: virtual, augmented and mixed reality. Key characteristics of immersive technologies. Application of immersive technologies in various fields.	<i>Lecture 1: Introduction to immersive technologies</i> Definition of immersive technologies. The history of the development of immersive technologies. Key characteristics of immersive technologies. Ethical issues of implementation of immersive technologies. The future of immersive technologies.
<i>Lecture 2: Virtual Reality (VR)</i> Concept of virtual reality. Technical means for creating VR. Software for developing VR applications. Principles of designing VR environments. Application of VR in education and professional training.	<i>Lecture 2: Augmented Reality (AR)</i> The concept of augmented reality. Tracking and recognition technologies in AR. AR display devices. Development of AR applications. Examples of AR application in various fields. Augmented reality browsers.
<i>Lecture 3: Augmented Reality (AR)</i> The concept of augmented reality. Tracking and recognition technologies in AR. AR display devices. Development of AR applications. Examples of AR application in various fields.	<i>Lecture 3: Virtual Reality (VR)</i> Concept of virtual reality. Types of virtual reality. Technical means for creating VR. Software for developing VR applications. Principles of designing VR environments. Application of VR in education and professional training. The future of virtual reality.
<i>Lecture 4: Mixed Reality (MR)</i> Mixed reality concept. Technologies for creating MR environments. Interaction with virtual objects in the real world. Development of mixed reality applications. Prospects for the development of MR.	<i>Lecture 4: Mixed Reality (MR)</i> Mixed reality concept. Technologies for creating MR environments. Interaction with virtual objects in the real world. Development of mixed reality applications. Prospects for the development of MR.
<i>Lecture 5: Immersive technologies in education</i> The role of immersive technologies in modern education. Virtual laboratories and simulators. Interactive learning environments. Gamification of the educational process using immersive technologies. Evaluation of the effectiveness of immersive technologies in education.	<i>Lecture 5: Basics of pattern recognition and software for designing augmented reality applications</i> Pattern recognition methods and tasks. OpenCV library. Graphic libraries. Computer vision algorithms. Software for designing augmented reality tools.
<i>Lecture 6: Development of immersive applications</i> Stages of development of immersive applications. Choosing a platform and development tools. User interface design for immersive environments. Optimizing the performance of immersive applications. Testing and quality assessment of immersive applications.	<i>Lecture 6: Development of immersive applications</i> Microsoft Windows Mixed Reality platform. Exploring Windows Mixed Reality devices. Thinking differently for mixed reality.
<i>Lecture 7: Immersive technologies in industry and business</i> Application of VR/AR in design and production. Immersive technologies in marketing and advertising. Virtual offices and remote collaboration. Training and professional development of personnel using immersive technologies. The economic effect of the introduction of immersive technologies.	<i>Lecture 7: Immersive technologies in education</i> The role of immersive technologies in modern education. Virtual laboratories and simulators. Technologies for creating specialized educational VR content.
<i>Lecture 8: The future of immersive technologies</i> Trends in the development of immersive technologies. Integration of immersive technologies with other advanced technologies (AI, IoT). Ethical and social aspects of using immersive technologies. Problems and challenges in the development of immersive technologies. Potential new areas of application of immersive technologies.	<i>Lecture 8: Immersive technologies in industry and business</i> Application of VR/AR in design and production. Immersive technologies in marketing and advertising. Virtual offices and remote collaboration. Training and professional development of personnel using immersive technologies.

The next step in developing the content for the course was to chat concerning each question in each lecture. After writing the prompt to generate the text for the lecture question and receiving the first answer, there was further communication with the chat to clarify or expand some aspects of the lecture question. For example, the following additional questions were used to develop the second question of the first lecture ("History of the development of immersive technologies"): What were the main innovations in immersive technologies in the 2000s? Which modern companies are leading in the development of immersive technologies? etc. So, it has led to developing lectures that partially used generated content and content from sources that were provided to Perplexity AI in the responses.

After that, we used the function of uploading files and set a task Perplexity AI to generate 30 questions of 3 types (multiple choice with one correct answer, true / false, blank questions) using the downloaded file. The first three queries were implemented using Pro Search. As a result, we received clearly structured test questions with clearly highlighted correct answers (See Fig. 5). Test questions for other lectures were generated using the Auto Mode function, which showed the difference between Pro Search and Auto Mode: in 4 cases out of 5, tests were provided with a list of correct answers at the end, which is very inconvenient.

After checking the correctness of the test questions, we asked Perplexity AI to format these test questions in XML format for importing into LMS Moodle (See Fig. 6). In addition, taking into account the results of Perplexity AI answers in Auto Mode, we improved the prompt by asking the chat to provide the correct answer immediately after the question (See Fig. 7).

Напиши 30 питань по типу множинний вибір з однією вірною відповіддю. Текст...

🔗 Pro Search 🔗 Sources 1 59 tasks ↗

Ось 30 тестових запитань типу множинного вибору на основі матеріалу лекції:

Частина 1: Основні поняття та історія AR

1. Хто вперше ввів термін "доповнена реальність"?
 - a) Іван Сазерленд
 - b) Том Кодел
 - c) Стів Манн
 - d) Луї Розенберг
2. Який пристрій 1968 року вважається першою AR-системою?
 - a) Microsoft HoloLens
 - b) Дамоклів меч
 - c) Google Glass
 - d) Oculus Rift
3. Хто створив перший носимий AR-пристрій у 1980 році?
 - a) Луї Розенберг
 - b) Стів Манн
 - c) Рональд Азума
 - d) Том Кодел

Fig 5. One example of generating Perplexity AI test questions from the provided file

Ось як можна оформити тестові питання у форматі XML для імпорту у Moodle:

```
xml
<?xml version="1.0" encoding="UTF-8"?>
<quiz>
  <!-- Питання 1 -->
  <question type="multichoice">
    <name>
      <text>Технології для створення 3D-моделей</text>
    </name>
    <questiontext format="html">
      <text>Яка з технологій дозволяє створити детальні 3D-моделі проєктів для інженерів та архітекторів?</text>
    </questiontext>
    <answer fraction="100">
      <text>Віртуальна реальність (VR)</text>
    </answer>
    <answer fraction="0">
      <text>Доповнена реальність (AR)</text>
    </answer>
    <answer fraction="0">
      <text>Змішана реальність (MR)</text>
    </answer>
  </question>
</quiz>
```

Fig. 6. Designing test questions in XML format for importing into LMS Moodle

II. Заповнення пропусків (10 запитань):

1. Відчуття фізичної присутності на відстані, досягнуте шляхом взаємодії з інтерфейсом системи, відоме як _____.
2. _____ реальність накладає цифровий контент на реальний світ.
3. _____ реальність поєднує елементи VR та AR, дозволяючи цифровим об'єктам взаємодіяти з реальним світом у режимі реального часу.
4. Загальна назва для AR- і VR-технологій - це _____.
5. _____ є станом свідомості, коли людина трансформує усвідомлення свого фізичного «я» завдяки оточенню в штучному середовищі.

III. Істинно/Хибно (10 запитань):

1. Імерсивні технології обмежуються лише віртуальною реальністю. (I/X)
2. Тактильне занурення пов'язане з розумовим викликом. (I/X)
3. Імерсивні технології не мають застосування в охороні здоров'я. (I/X)
4. Ефективність імерсивних технологій залежить лише від технічних характеристик. (I/X)
5. Сенсорна поєднувала 3D-відео, звук, запахи та віброюче крісло. (I/X)

Fig. 7. Examples of tests generated by Perplexity AI in Auto Mode with a refined query

It should be noted that the lecture material generated by Perplexity AI has been modified and improved to provide more accurate and complete information for students. Also, the test questions were changed in some cases, but in general these changes did not exceed 50%.

Conclusions. Having analysed capabilities and features of Perplexity AI on the basis of academic articles from the Scopus and Web of Science databases, we can highlight, firstly, the advantages of this AI chat: providing, in addition to answers, accurate sources and additional questions; ability to work well with general knowledge, reasoning and evidence-based knowledge; providing a reliable answer with relevant data and information; offering greater search capabilities; focus on clarity and efficiency of answers; skill in managing long conversations; maintaining context during long interactions. Secondly, the following disadvantages of Perplexity AI should be noted: the lowest accuracy compared to ChatGPT-4, Google Bard (Gemini) and Chatsonic; inconsistent performance across categories, lower resistance to hallucinations; partial use of unreliable sources for citations such as blog posts or unreliable sources; low performance and insufficient readability.

To develop educational content, in particular, theoretical material for lectures with the help of Perplexity AI, you can use flushes in the following sequence: the main prompt with a request for the generation of a lecture plan, prompts for each question of the lecture with an emphasis on the style of the text and the use of relevant primary sources, clarifying prompts for adding or clarifying details to the generated text.

To develop test questions for the generated theoretical material, it was more effective and convenient to use Pro Search, which allowed to get clear test questions with exact correct answers in a convenient format. When using Auto Mode, you need to provide more details to get the desired result. So, in general, we consider the results of the development of lecture material and test questions for it with the help of Perplexity AI to be satisfactory, even when using the free plan. The vast majority of the training content was well-structured, relevant, accurate, up-to-date, informative, and the quality of the information could be verified using the links provided by Perplexity AI. At the same time, we think it is appropriate to emphasize the correct writing of prompts and the use of hints and sources provided by Perplexity AI. In the perspective of further research, we believe it is worthwhile investigating the opinion of students and experts regarding the quality of lecture material and tests developed with the help of Perplexity AI, and compare it with the use of other AI-chats.

Bibliography

- Bailyn, E. (2025). *Top Generative AI Chatbots by Market Share – March 2025*. Retrieved from <https://firstpagesage.com/reports/top-generative-ai-chatbots>
- Benítez Rojas, R. V. (2024). Artificial intelligence. Genesis, Development and Future. In F.-J. Martínez-Cano, R. V. Benítez Rojas (Eds.), *Revolutionizing Communication: The Role of Artificial Intelligence* (pp. 1–15). Broken: CRC Press. doi: 10.1201/9781003473633-1
- Bir Yücel, K., Sutcuoglu, O., Yazıcı, O., Ozet, A., Ozdemir, N. (2024). Can artificial intelligence provide accurate and reliable answers to cancer patients' questions about cancer pain? Comparison of chatbots based on ESMO cancer pain guideline. *Memo – Magazine of European Medical Oncology*, 17(4), 302–306. doi: 10.1007/s12254-023-00954-6
- Carlson, J. A., Cheng, R. Z., Lange, A., Nagalakshmi, N., Rabets, J., Shah, T. R., Sindhvani, P. (2024). Accuracy and readability of artificial intelligence chatbot responses to vasectomy-related questions: Public beware. *Cureus Journal of Medical Science*, 16(8), Article e67996. doi: 10.7759/cureus.67996
- Chataut, R., Upadhyay, A., Usman, Y., Nankya, M., Gyawali, P. K. (2024). Spam no more: A cross-model analysis of machine learning techniques and large language model efficacies. In *Proceedings of the 8th Cyber Security in Networking Conference: AI for Cybersecurity* (pp. 116–122). Paris, France. doi: 10.1109/csnet64211.2024.10851763
- da Trindade, A., de Oliveira, H. P. C. (2024). Generative artificial intelligence (AI) and information literacy: informational skills necessary for the use of generative AI tools in informational demands of an academic-scientific nature. *Perspectives in Information Science*, 29, Article e47485. doi: 10.1590/1981-5344/47485
- Duarte, F. (2025). Number of ChatGPT users (March 2025). *Exploding Topics*. Retrieved from <https://explodingtopics.com/blog/chatgpt-users>
- Freeman, L. A. (2015). Instructor time requirements to develop and teach online courses. *Online Journal of Distance Learning Administration*, 18(1). Retrieved from <https://aisel.aisnet.org/cgi/viewcontent.cgi?article=1007&context=siged2013>.

Ghapanchi, A, Purarjomandlangrudi, A. (2023). ChatGPT and generative AIs: What it means for academic assessments. In *Information Systems Education Conference*, 30 Mar 2023 – 1 Apr 2023, Plano, TX, USA. 191856.

Gomez, D. (2024). File upload. *Perplexity*. Retrieved from <https://www.perplexity.ai/help-center/en/articles/10354807-file-upload>

Gomez, D. (2025). What is Perplexity Pro? *Perplexity*. Retrieved from <https://www.perplexity.ai/help-center/en/articles/10352901-what-is-perplexity-pro>

Gotta, J., Hong, Q. A. L., Koch, V., Gruenewald, L. D., Geyer, T., Martin, S. ... Reschke, P. (2024). Large language models (LLMs) in radiology exams for medical students: Performance and consequences. *Rofo Advances in the Field of X-Rays and Imaging Proceedings*. doi: 10.1055/a-2437-2067.

Halawani, A., Almeahmadi, S. G., Alhubaishy, B. A., Alnefaie, Z. A., Hasan, M. N. (2024). Empowering patients: how accurate and readable are large language models in renal cancer education. *Frontiers in Oncology*, 14, Article 1457516. doi: 10.3389/fonc.2024.1457516

Huo, B., Calabrese, E., Sylla, P., Kumar, S., Ignacio, R. C., Oviedo, R., ... Vosburg, W. (2024). The performance of artificial intelligence large language model-linked chatbots in surgical decision-making for gastroesophageal reflux disease. *Surgical Endoscopy and Other Interventional Techniques*, 38(5), 2320–2330. doi: 10.1007/s00464-024-10807-w

Kaul, V., Enslin, S., Gross, S. A. (2020). History of artificial intelligence in medicine. *Gastrointestinal Endoscopy*, 92(4), 807–812. doi: 10.1016/j.gie.2020.06.040

McIntosh, T. R., Liu, T., Susnjak, T., Watters, P., Ng, A., Halgamuge, M. N. (2024). A culturally sensitive test to evaluate nuanced GPT hallucination. *IEEE Transactions on Artificial Intelligence*, 5(6), 2739–2751. doi: 10.1109/TAI.2023.3332837

Naseri, A., Antikchi, M. H., Barahman, M., Shirinzadeh-Dastgiri, A., Haghighikhan, S. M., Vakil-Ojarood ... Neamatzadeh, H. (2024). AI Chatbots in oncology: A comparative study of sider fusion AI and Perplexity AI for gastric cancer patients. *Indian Journal of Surgical Oncology*. doi: 10.1007/s13193-024-02145-z

Pan, Y. (2016). Heading toward Artificial Intelligence 2.0. *Engineering*, 2(4), 409–413. doi: 10.1016/J.ENG.2016.04.018

Pizarro Romero, J. (2024). Performance of AI in searching for specialized sources and writing academic texts. *Language and Society*, 23(2), 911–944. doi: 10.15381/lengsoc.v23i2.27856

Podder, I., Pipil, N., Dhabal, A., Mondal, S., Pienyii, V. J., Mondal, H. (2024). Evaluation of artificial intelligence-based chatbot responses to common dermatological queries. *Jordan Medical Journal*, 58(2), 271–278. doi: 10.35516/jmj.v58i2.2960

Qian, M., Wu, H. (2023). Translators as information seekers: strategies and novel techniques. *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), Part II*, 150–166. doi: 10.1007/978-3-031-35894-4_11

Saeedi, S., Aghajanzadeh, M. (2024). Investigating the role of artificial intelligence in predicting perceived dysphonia level. *European Archives of Oto-Rhino-Laryngology*, 281(11), 6093–6097. doi: 10.1007/s00405-024-08868-7

Saner, F. H., Saner, Y. M., Abufarhaneh, E., Broering, D. C., Raptis, D. A. (2024). Comparative analysis of artificial intelligence (AI) languages in predicting sequential organ failure assessment (SOFA) scores. *Cureus Journal of Medical Science*, 16(5), Article e59662. doi: 10.7759/cureus.59662

Tilwani, D., Venkataramanan, R., Sheth, A.P. (2024). Neurosymbolic AI approach to attribution in large language models. *IEEE Intelligent Systems*, 39(6), 10–17. doi: 10.1109/mis.2024.3477108

Uppalapati, V. K., Nag, D. S. (2024). A comparative analysis of AI Models in complex medical decision-making scenarios: Evaluating ChatGPT, Claude AI, Bard, and Perplexity. *Cureus Journal of Medical Science*, 16(1), Article e52485. doi: 10.7759/cureus.52485

Utami, P. L., Suprpto, N., Hidaayatullaah, H. N., Cheng, T. H. (2024). The comparison of Chat GPT, Perplexity AI, and Scopus database to capture Indonesian higher education quality in achieving SDGs 2030. *E3S Web of Conferences*, 513, Article e 04001. doi: 10.1051/e3s-conf/202451304001

Vu, T., Iyyer, M., Wang, X., Constant, N., Wei, J., Wei, J. ... Luong, T. (2024). FRESHLLMs: Refreshing large language models with search engine augmentation. In *Findings of the Association for Computational Linguistics: ACL 2024* (pp. 13697–13720). Bangkok, Thailand: Association for Computational Linguistics. doi: 10.18653/v1/2024.findings-acl.813

References

- Bailyn, E. (2025). *Top Generative AI Chatbots by Market Share – March 2025*. Available at: <https://firstpagesage.com/reports/top-generative-ai-chatbots> (Accessed 10 March).
- Benítez Rojas, R. V. (2024). Artificial intelligence. Genesis, development and future. *Revolutionizing Communication: The Role of Artificial Intelligence*. Broken, CRC Press, pp. 1–15. doi: 10.1201/9781003473633-1
- Bir Yücel, K., Sutcuoglu, O., Yazıcı, O., Ozet, A., Ozdemir, N. Can artificial intelligence provide accurate and reliable answers to cancer patients' questions about cancer pain? Comparison of chatbots based on ESMO cancer pain guideline. *Memo – Magazine of European Medical Oncology*, 2024, vol. 17(4), pp. 302–306. doi: 10.1007/s12254-023-00954-6
- Carlson, J. A., Cheng, R. Z., Lange, A., Nagalakshmi, N., Rabets, J., Shah, T. R., Sindhwani, P. Accuracy and readability of artificial intelligence chatbot responses to vasectomy-related questions: Public beware. *Cureus Journal of Medical Science*, 2024, no. 16(8), AN: e67996. doi: 10.7759/cureus.67996
- Chataut, R., Upadhyay, A., Usman, Y., Nankya, M., Gyawali, P. K. (2024). Spam no more: A cross-model analysis of machine learning techniques and large language model efficacies. *Proc. the 8th Scien. and Pract. Conf. "Cyber Security in Networking Conference: AI for Cybersecurity"*. Paris, France, pp. 116–122. doi: 10.1109/csnet64211.2024.10851763
- da Trindade, A., de Oliveira, H. P. C. Generative artificial intelligence (AI) and information literacy: informational skills necessary for the use of generative AI tools in informational demands of an academic-scientific nature. *Perspectives in Information Science*, 2024, vol. 29, Article e47485. doi: 10.1590/1981-5344/47485 (in Portuguese).
- Duarte, F. (2025). Number of ChatGPT users (March 2025). *Exploding Topics*. Available at: <https://explodingtopics.com/blog/chatgpt-users> (Accessed 10 March).
- Freeman, L. A. Instructor time requirements to develop and teach online courses. *Online Journal of Distance Learning Administration*, 2015, vol. 18(1), 15 p. Available at: <https://aisel.ais-net.org/cgi/viewcontent.cgi?article=1007&context=siged2013> (Accessed 10 March).
- Ghapanchi, A, Purarjomandlangrudi, A. (2023). ChatGPT and generative AIs: What it means for academic assessments. *Proc. Information Systems Education Conference*. Plano, TX, USA, AN: 191856.
- Gomez, D. (2024). File upload. *Perplexity*. Available at: <https://www.perplexity.ai/help-center/en/articles/10354807-file-upload> (Accessed 10 March).
- Gomez, D. (2025). What is Perplexity Pro? *Perplexity*. Available at: <https://www.perplexity.ai/help-center/en/articles/10352901-what-is-perplexity-pro> (Accessed 10 March).
- Gotta, J. et al. Large language models (LLMs) in radiology exams for medical students: Performance and consequences. *Rofo Advances in the Field of X-Rays and Imaging Proceedings*, 2024. doi: 10.1055/a-2437-2067.
- Halawani, A., Almeahmadi, S.G., Alhubaishy, B.A., Alnefaie, Z.A., Hasan, M.N. Empowering patients: how accurate and readable are large language models in renal cancer education. *Frontiers in Oncology*, 2024, vol. 14, AN: 1457516. doi: 10.3389/fonc.2024.1457516
- Huo, B., et al. The performance of artificial intelligence large language model-linked chatbots in surgical decision-making for gastroesophageal reflux disease. *Surgical Endoscopy and Other Interventional Techniques*, 2024, vol. 38(5), pp. 2320–2330. doi: 10.1007/s00464-024-10807-w
- Kaul, V., Enslin, S., Gross, S. A. History of artificial intelligence in medicine. *Gastrointestinal Endoscopy*, 2020, no. 92(4), pp. 807–812. doi: 10.1016/j.gie.2020.06.040
- McIntosh, T. R., Liu, T., Susnjak, T., Watters, P., Ng, A., Halgamuge, M. N. A culturally sensitive test to evaluate nuanced GPT hallucination. *IEEE Transactions on Artificial Intelligence*, 2024, vol. 5, issue 6, pp. 2739–2751. doi: 10.1109/TAI.2023.3332837
- Naseri, A., et al. AI Chatbots in oncology: A comparative study of sider fusion AI and Perplexity AI for gastric cancer patients. *Indian Journal of Surgical Oncology*, 2024. doi: 10.1007/s13193-024-02145-z
- Pan, Y. (2016). Heading toward Artificial Intelligence 2.0. *Engineering*, vol. 2, issue 4, pp. 409–413. doi: 10.1016/J.ENG.2016.04.018
- Pizarro Romero, J. Performance of AI in searching for specialized sources and writing academic texts. *Language and Society*, 2024, vol. 23, no. 2, pp. 911–944. doi: 10.15381/lengsoc.v23i2.27856

Podder, I., Pipil, N., Dhabal, A., Mondal, S., Pienyii, V. J., Mondal, H. Evaluation of artificial intelligence-based chatbot responses to common dermatological queries. *Jordan Medical Journal*, 2024, vol. 58, no. 2, pp. 271–278. doi: 10.35516/jmj.v58i2.2960

Qian, M., Wu, H. (2023). Translators as information seekers: strategies and novel techniques. *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, Part II, pp. 150–166. doi: 10.1007/978-3-031-35894-4_11

Saeedi, S., Aghajanzadeh, M. Investigating the role of artificial intelligence in predicting perceived dysphonia level. *European Archives of Oto-Rhino-Laryngology*, 2024, vol. 281(11), pp. 6093–6097. doi: 10.1007/s00405-024-08868-7

Saner, F.H., Saner, Y.M., Abufarhaneh, E., Broering, D. C., Raptis, D. A. Comparative analysis of artificial intelligence (AI) languages in predicting sequential organ failure assessment (SOFA) scores. *Cureus Journal of Medical Science*, 2024, vol. 16(5), AN: e59662. doi: 10.7759/cureus.59662

Tilwani, D., Venkataramanan, R., Sheth, A. P. Neurosymbolic AI approach to attribution in large language models. *IEEE Intelligent Systems*, 2024, vol. 39, issue 6, pp. 10–17. doi: 10.1109/mis.2024.3477108

Uppalapati, V. K., Nag, D. S. A comparative analysis of AI Models in complex medical decision-making scenarios: Evaluating ChatGPT, Claude AI, Bard, and Perplexity. *Cureus Journal of Medical Science*, 2024, vol. 16(1), AN: e52485. doi: 10.7759/cureus.52485

Utami, P. L., Suprpto, N., Hidaayatullaah, H. N., Cheng, T. H. The comparison of Chat GPT, Perplexity AI, and Scopus database to capture Indonesian higher education quality in achieving SDGs 2030. *E3S Web of Conferences*, 2024, vol. 513, AN: 04001. doi: 10.1051/e3s-conf/202451304001

Vu, T., et al. (2024). FRESHLLMS: Refreshing large language models with search engine augmentation. Proc. Scien. and Pract. Conf. “Findings of the Association for Computational Linguistics: ACL 2024”. Bangkok, Thailand, Association for Computational Linguistics Publ., pp. 13697–13720. doi: 10.18653/v1/2024.findings-acl.813

EXPERIENCE OF USING THE PERPLEXITY AI-POWERED ANSWERING SYSTEM FOR EDUCATIONAL CONTENT GENERATION

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The development of educational materials for courses taught in higher education institutions is a labour-intensive process that consumes a significant proportion of academic staff time. With the advancement of text generation tools powered by artificial intelligence, educators have gained the opportunity to enhance and accelerate this process.

The purpose of the study is to analyse the capabilities and specific features of the web-based search engine Perplexity AI, which is built on a large language model, for the development of theoretical lecture content and test questions based on the generated material.

The study addresses the following objectives: to identify the capabilities and features of Perplexity AI as described by researchers in academic publications; and to analyse its potential for developing educational content, particularly theoretical material for lectures and test questions derived from it.

Research methods. *The study employs the literature review method and the method of qualitative analysis of responses generated by Perplexity AI. The literature review was conducted through searches in*

the Scopus and Web of Science databases to analyse recent research and publications in order to identify the capacities and limitations of Perplexity AI.

As a result of this analysis, the advantages and drawbacks of Perplexity AI in tasks related to text generation and user queries were identified. The qualitative analysis method was applied to examine practical outcomes based on hands-on experience using the tool in the process of generating educational content. For the purpose of this study, the authors developed educational materials with the help of Perplexity AI, including eight lectures for the course "Immersive Technologies" and accompanying test questions based on the generated content. The relevance, accuracy, currency, and informativeness of the content were then analysed using the provided primary sources.

It has been established that the strengths of Perplexity AI include the provision of precise sources and follow-up questions alongside query responses; effective handling of general knowledge, reasoning, and evidence-based content; reliable responses supported by relevant data; extensive search capabilities; a focus on clarity and efficiency of answers; the ability to sustain long-form conversations; and maintenance of context in extended interactions. The identified weaknesses of Perplexity AI compared to ChatGPT-4, Google Bard (Gemini), and Chatsonic include lower accuracy; inconsistent performance across categories; reduced resistance to hallucinations; occasional use of unreliable sources such as blogs for citations; and issues with performance and readability.

The study revealed that for the effective development of educational content – particularly theoretical lecture material – Perplexity AI can be used with prompts following this sequence: an initial prompt requesting the generation of a lecture outline; individual prompts for each lecture topic with emphasis on the text style and the use of appropriate sources; and clarifying prompts to add or refine content within the generated text.

Conclusions. The development of lecture material and test questions using Perplexity AI can be considered satisfactory, even within the framework of the free plan. The majority of the generated educational content was well-structured, relevant, accurate, up-to-date, and informative, with source quality being verifiable through the hyperlinks provided by the system. Achieving such results requires carefully formulated prompts and appropriate use of the references and suggestions offered by Perplexity AI.

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