AI-HED
Artificial Intelligence in Higher Education Teaching and Learning

Starter Kit

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Language models and other AI-based tools were used in the process of creating this document.

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Contents

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Digital Competencies and AI-based Tools

Universities worldwide are pressed to utilise AI to enhance the way they teach, learn, and collaborate. This chapter explores the synergy between the DigComp 2.2 framework, which outlines fundamental skills for digital literacy, and an array of AI-based tools selected especially for their relevance in higher education. We begin by presenting an overview of DigComp 2.2 (Sec. 1.1), a common language to describe competencies ranging from information and data literacy to problem solving and safety. Next, we introduce a set of categories (see Sec. 1.2), each describing broad scenarios of use that address various teaching and learning goals. We then offer a heatmap (Sec. 1.3) showing how AI-based tools align with Bloom's taxonomy levels across the DigComp competencies, offering a visual guide that helps educators make informed decisions. Finally, we present a comprehensive list of AI-based tools, highlighting their core features, examples what to use them for, cost structures, and estimated ease of use.

By blending theory with clear examples, this chapter emphasizes how AI can become a usable and effective asset rather than a mere novelty. Educators and learners alike can draw on these insights to integrate technology with a clear and specific goal, increasing engagement and promoting deeper understanding of the taught material. In doing so, they pave the way for more meaningful, accessible, and forward-looking educational experiences.

Identified Relevant Competencies

Digital transformation has changed the way we live, learn, and work. To thrive today, we must master practical digital skills that help us find, assess, and create online information, stay safe online, and solve problems in new ways. DigComp 2.2 [1], short for "The Digital Competence Framework for Citizens," gives us a roadmap for all these

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skills. Developed by the European Commission's Joint Research Centre, it lays out five main groups of digital competencies, with 21 specific competencies across those groups. Each group covers an important aspect of digital literacy and is described using examples of the knowledge, skills, and attitudes that citizens and learners need in modern life. Through clearly mapping these competencies, DigComp 2.2 shapes policies, sets targets for training and guides anyone who wants to help modern learners gain digital confidence. The framework and the mapping it provides also tie in with the idea that higher education must respond to societal changes, wherein we must also include the expansion of artificial intelligence.

The five main competence areas in DigComp 2.2 start with **Information and Data Literacy**. This area covers searching, evaluating, and managing information. We use online search engines daily but do not always stop to think about who wrote or funded the top results. DigComp 2.2 urges us to check sources, spot bias, and stay aware of misinformation (sometimes called "fake news"), especially when we read or share information. It also provides guidance on how to store and organise data for easy retrieval. The vast amount of online information in the modern world can be daunting, but these skills help us navigate the noise and make good decisions.

The following competencies are part of the above-described group of competencies:

1.1 Browsing, Searching and Filtering Data, Information and Digital Content
Description. 'To articulate information needs , to search for data, information and content in digital environments, to access them and to navigate between them. to create and update personal search strategies.' [1]

1.2 Evaluating Data, Information and Digital Content
Description. 'To analyse, compare and critically evaluate the credibility and reliability of sources of data, information and digital content. to analyse, interpret and critically evaluate the data, information and digital content.' [1]

1.3 Managing Data, Information and Digital Content
Description. 'To organise, store and retrieve data, information, and content in digital environments. to organise and process them in a structured environment.' [1]

The second area of competencies is **Communication and Collaboration**, which describes how people interact with each other using digital tools. On a fundamental level, this concerns sending a polite email or using communication software for group projects and teamwork. It also encompasses more profound concepts, such as being a responsible "digital citizen," treating others with respect in the social media context, and sharing content while acknowledging authorship and giving credit where credit

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is due. It often happens nowadays that we work or study in teams that share non-virtual and virtual spaces alike, and DigComp 2.2 guides us on how to collaborate well, whether we are simply using shared and co-authored documents, moderated wiki pages, or video chat and video calling services. This group of competencies links directly to higher education, where lecturers can promote or even demand teamwork, group assignments, and online discussions that teach students to work as teams, even if they are spread across the globe or consist of diverse individuals on whichever basis.

The following competencies are part of the above-described group of competencies:

2.1 INTERACTING THROUGH DIGITAL TECHNOLOGIES
Description. 'To interact through a variety of digital technologies and to understand appropriate digital communication means for a given context.' [1]

2.2 SHARING THROUGH DIGITAL TECHNOLOGIES
Description. 'To share data, information and digital content with others through appropriate digital technologies. to act as an intermediary, to know about referencing and attribution practices.' [1]

2.3 ENGAGING CITIZENSHIP THROUGH DIGITAL TECHNOLOGIES
Description. 'To participate in society through the use of public and private digital services. to seek opportunities for self-empowerment and for participatory citizenship through appropriate digital technologies.' [1]

2.4 COLLABORATING THROUGH DIGITAL TECHNOLOGIES
Description. 'To use digital tools and technologies for collaborative processes, and for co-construction and co-creation of data, resources and knowledge.' [1]

2.5 NETIQUETTE
Description. 'To be aware of behavioural norms and know-how while using digital technologies and interacting in digital environments. to adapt communication strategies to the specific audience and to be aware of cultural and generational diversity in digital environments' [1]

2.6 MANAGING DIGITAL IDENTITY
Description. 'To create, and manage one or multiple digital identities, to be able to protect one's own reputation, to deal with the data that one produces through several digital tools, environments and services.' [1]

The next area of competencies is **Digital Content Creation**. This group comprises competencies that go beyond writing a simple blog post or fundamental editing of photos – they also deal with understanding copyright and licenses, knowing how to reuse, remix, or repurpose digital content, and even some programming basics. The latter grows more relevant each year as software and AI-based tools get included in nearly

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all fields of human activity – from engineering to humanities. For example, higher education students could use AI-based tools and platforms to help them produce or refine their term papers, research papers, or theses, or they might learn to build simple software to solve mundane, repetitive, or complex problems in their discipline. DigComp 2.2 provides an overview of the competencies necessary for ensuring a solid foundation for these tasks.

The following competencies are part of the above-described group of competencies:

3.1 DEVELOPING DIGITAL CONTENT
Description. 'To create and edit digital content in different formats, to express oneself through digital means' [1]

3.2 INTEGRATING AND RE-ELABORATING DIGITAL CONTENT
Description. 'To modify, refine and integrate new information and content into an existing body of knowledge and resources to create new, original and relevant content and knowledge.' [1]

3.3 COPYRIGHT AND LICENCES
Description. 'To understand how copyright and licences apply to digital information and content.' [1]

3.4 PROGRAMMING
Description. 'To plan and develop a sequence of understandable instructions for a computing system to solve a given problem or to perform a specific task.' [1]

The fourth area of competencies is **Safety**. Data protection, privacy, and mental well-being are only some of the concepts that belong here. This set of competencies covers the need to protect user devices from malware, secure private data, and maintain mental and physical health in a digital environment. In addition to the mentioned topics of cybersecurity, it also touches on the ethics of AI use. For instance, specific AI-based systems can analyse our search history or personal details to customise a service or provide advertisements better suited to our profiles. Therefore, we must remain alert to how our data might be used or shared. Higher-education instructors can address these important topics by providing students with examples of best practices, such as carefully choosing their cloud-storage provider, recognising phishing attempts in email messages, or managing screen time to avoid stress or related mental issues.

The following competencies are part of the above-described group of competencies:

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4.1 PROTECTING DEVICES

Description. 'To protect devices and digital content, and to understand risks and threats in digital environments.to know about safety and security measures and to have a due regard to reliability and privacy.' [1]

4.2 PROTECTING PERSONAL DATA AND PRIVACY

Description. 'To protect personal data and privacy in digital environments. to understand how to use and share personally identifiable information while being able to protect oneself and others from damages. to understand that digital services use a "Privacy policy" to inform how personal data is used.' [1]

4.3 PROTECTING HEALTH AND WELL-BEING

Description. 'To be able to avoid health-risks and threats to physical and psychological well-being while using digital technologies. to be able to protect oneself and others from possible dangers in digital environments (e.g. cyber bullying). to be aware of digital technologies for social well-being and social inclusion.' [1]

4.4 PROTECTING THE ENVIRONMENT

Description. 'To be aware of the environmental impact of digital technologies and their use.' [1]

The final competence area of **Problem Solving** deals with competencies related to fixing technical issues, choosing the right digital tools to meet a set goal, and creatively combining various applications or data sources to solve problems successfully. Furthermore, this area includes self-identifying an individual's gaps in digital skills and seeking to improve them. For example, some AI-based systems, such as chatbots and similar assistants, can help us support creative problem-solving processes. Students in a university setting might learn to harness AI-based tools and models that suggest advanced research sources or help them code more efficiently. Nevertheless, DigComp 2.2 reminds us that people remain in charge of the problem-solving process for now; it is important not to leave the decision-making processes entirely to AI-based systems and models. We can use AI-based tools, but we must question their outcomes, check their suggestions, and remain aware of bias in the data that the used models were trained on.

The following competencies are part of the above-described group of competencies:

5.1 SOLVING TECHNICAL PROBLEMS

Description. 'To identify technical problems when operating devices and using digital environments, and to solve them (from trouble-shooting to solving more complex problems).' [1]

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5.2 IDENTIFYING NEEDS AND TECHNOLOGICAL RESPONSES
Description. 'To assess needs and to identify, evaluate, select and use digital tools and possible technological responses and to solve them. to adjust and customise digital environments to personal needs (e.g. accessibility).' [1]

5.3 CREATIVELY USING DIGITAL TECHNOLOGY
Description. 'To use digital tools and technologies to create knowledge and to innovate processes and products. to engage individually and collectively in cognitive processing to understand and resolve conceptual problems and problem situations in digital environments.' [1]

5.4 IDENTIFYING DIGITAL COMPETENCE GAPS
Description. 'To understand where one's own digital competence needs to be improved or updated. to be able to support others with their digital competence development. to seek opportunities for self-development and to keep up-to-date with the digital evolution.' [1]

The reader might have recognised by now the layered approach of DigComp 2.2. It does not just name the five competence groups. Each group is broken down into individual competencies, as shown above. Furthermore, each specific competency has eight proficiency levels divided into four levels. This organisation helps teachers, trainers, and policy-makers develop lessons and tests customised to their specific courses and learning objectives. For example, a first-year student might only be expected to identify a reliable source of information. In contrast, a more experienced student can be expected to judge the credibility of sources or protect personal data without extra help. The framework's many examples show how it applies in daily life. The following is an AI-related attitude example within the competency 2.1 INTERACTING THROUGH DIGITAL TECHNOLOGIES: 'Open to AI systems supporting humans to make informed decisions in accordance with their goals (e.g. users actively deciding whether to act upon a recommendation or not).' [1] The following is an AI-related knowledge example within the competency 3.2 CREATING DIGITAL CONTENT: 'Knows that AI systems can be used to automatically create digital content (e.g. texts, news, essays, tweets, music, images) using existing digital content as its source. Such content may be difficult to distinguish from human creations.' [1]

DigComp 2.2 is not necessarily for students and teachers only. The competencies therein are also for administrators and anyone who wants to help learners succeed. For example, a university professor might use the framework to design a course that teaches students to use AI-based tools in a way that respects privacy and fairness; a university librarian might use it to help students find and evaluate digital sources for their research papers; a university IT specialist might use it to train staff in secure data management. Rather than a single program or curriculum, DigComp 2.2 is a flexible

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foundation that can fit local needs across Europe and beyond.

In modern higher education, a balanced approach to digital competence is crucial [2]–[4]. On one side, students and staff expect advanced technology in the lecture hall and we witness a surge of various AI-based tools for writing, data analysis, and content creation that can foster learning. Conversely, a significant stagnation in knowledge on using these tools efficiently, safely, and ethically, protecting data, and maintaining mental well-being in the modern landscape is observed. DigComp 2.2 makes some of these questions explicit. It helps university leaders and faculty see how to train staff and students in digital ethics, integrate digital tools into classes and the teaching and learning processes, and encourage learners to keep their data safe and secure. By building strong digital competencies, colleges can turn AI from a curiosity into a positive force that helps members of the faculty, staff, and students solve problems and create new knowledge.

This framework was chosen for the activities of this project because it provides a clear, shared language for digital skills that are important to modern teaching. It can be used as a reference for designing courses, tasks, and student assessments that blend technical skills (e.g. programming or data management) with responsible, critical habits (e.g. analysing sources or protecting privacy). It recognises how the digital world keeps evolving as new technologies, including AI, reshape everything – from public services to the job market.

Defined Categories of Tools

Universities worldwide consider artificial intelligence (AI) an incentive for better teaching and learning. AI is more than simply a gadget or a tool for having fun. In higher education institutions, it is about creating an environment that fosters creativity, enhances collaboration, and allows individual learners to advance at their own pace. The following categories of AI-based tools highlight key themes identified in and drawn from the DigComp 2.2 framework [1], described in more detail in Sec. 1.1, which lays out digital competencies that matter for members of the faculty, staff, and students in higher education. In practice, these themes can be observed as guides for using technology to complement, rather than replace, the esteemed teaching and learning processes.

Once a traditional paper-and-pen affair, AI-based systems can now enrich assessments that effortlessly analyse student input, provide immediate insights, and adapt tasks to the learner's needs. However, this blend of automation and personalisation does not strip away an educator's job. It provides them with more time that they can use to focus on core educational goals instead of mechanical grading. That is not

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to say that assessment should be handed entirely to an algorithm, as currently available AI-based tools and related models might not be adapted enough for unsupervised assessment. Likewise, if collaboration is the beating heart of modern classrooms, AI-based chat tools and virtual collaboration platforms are prime mediums for rendering building group projects more effectively. Students in remote or hybrid contexts, including students with special needs or disabilities when compared to the majority, need ways to share ideas smoothly and stay engaged. Ai-driven assistants who coordinate tasks or offer real-time feedback can make that happen.

The following categories of tools are described in the paragraph above:

- ASSESSMENT AND FEEDBACK
  Description. AI tools designed for generating quizzes, automating grading, and providing personalized feedback (e.g., Cognii, Turnitin AI) aim to assist educators in creating diverse quizzes and test questions using artificial intelligence technologies and innovative learning approaches; these tools enable educators to assess student work more efficiently and provide tailored feedback.

- COLLABORATION AND INTERACTION
  Description. Tools to facilitate teamwork and digital communication, such as Microsoft Copilot and MindMap AI; tools designed to enhance teamwork, communication, and collaboration in remote and in-person settings; platforms and functionalities that enable individuals and teams to share ideas, coordinate tasks, and work on projects effectively.

- PRODUCTIVITY FOR STUDENTS
  Description. These tools help educators integrate the management of time, work and learning process in the learning course; tools that help manage resources and help students manage their time, stay organized and increase efficiency in the learning process.

Content creation, which once required juggling a selection of design software and spending much time searching through stock images, receives a fresh start when AI suggestions and automated design features come together. Rather than stifling human imagination and imposing constraints on creative productivity, these tools remove barriers to quality production. Instructors and students no longer need to spend hours tinkering with colour schemes, formatting, or copywriting. Instead, they can devote more energy to shaping ideas that spark genuine learning (it is worth noting that some contest this point of view [5]). This push forward in various areas is observed in refined communication, which encourages using AI-based tools and models for language processing. As large volumes of text must often be translated or summarised, these services grow more relevant, opening opportunities for multilingual research and inclusive collaboration.

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The following categories of tools are described in the paragraph above:

- CONTENT CREATION AND ENHANCEMENT
  Description. Tools for creating presentations,and visual/auditory materials/artifacts (e.g., Canva AI, Stability AI, Tome AI); these tools leverage artificial intelligence to assist educators in creating and improving various types of content, including presentations, visual designs, and auditory materials ;they provide features like automated design suggestions, content generation, and customization options, enabling users to produce professional-quality outputs with minimal effort.
- GENERATING INTERACTIVE LESSONS, COURSES, AND QUIZZES
  Description. Tools designed to create dynamic, engaging, and interactive educational experiences that require active participation from students; they empower educators to build custom lessons, courses, and quizzes that incorporate multimedia elements, 3D visualizations, and responsive design features; tools like Magician for Figma and 3DGPT which it requires interaction/reaction from students.
- LANGUAGE AND NATURAL LANGUAGE PROCESSING
  Description. Tools for multilingual collaboration and enhanced communication; tools that use AI to help educators improve their language skills or handle large text-based content.

Along with digitisation came heavier data traffic everywhere, including university systems, wherefore attention to cybersecurity plays an important role. AI-based tools can guide students and other stakeholders in spotting suspicious emails or password breaches, potentially warding off digital risks. Student records may not be medical or social security data but constitute valuable data nonetheless [6]. By understanding how digital footprints are left across platforms, everyone on campus can be more confident in using online tools. Data management, in this context, is not only about scanning for threats but includes perspectives on tools that help gather, sort, and evaluate information to ensure that educators and students can retrieve useful facts in seconds, freeing time and mental space for learning, deeper analysis, and applied critical thinking.

The following categories of tools are described in the paragraph above:

- CYBERSECURITY AWARENESS
  Description. These tools and resources help faculty, staff, and students at colleges and universities protect sensitive academic data and keep online activities secure. They teach how to recognize online scams, safeguard personal and institutional information, and use strong passwords. They also guide instructors on how to use digital tools safely in classrooms or online courses, follow data protection rules, and avoid privacy breaches involving student information.

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- Data and Information Management and Evaluation
  Description. Tools for managing and evaluating data and digital content; tools designed to facilitate the organization, analysis, and assessment of data and content in digital formats; tools that improve data handling accuracy and enhance the overall quality of content management processes; data cleaning, visualization, content categorization, metadata management, and performance evaluation.

- Inquiry and Learning Process Facilitation
  Description. AI tools support exploratory and specific learning methods by helping educators create, review, and expand knowledge to foster deeper understanding; these tools can be used to implement specialized teaching methods and assist students in approaches such as project-based learning, problem-based learning, and work-based learning.

Amid the recent developments in the information technology domain, and AI in particular, there is a growing awareness of the environmental consequences of digital technology [7], [8]. Many AI-based tools need data centres and processing power, which can produce a significant carbon footprint. Universities can teach students to be mindful digital citizens by adopting energy-saving habits. Furthermore, through the efficient, mindful, and knowledgeable use of AI-based tools, environmental awareness may be turned into reality via modern and as-of-yet undiscovered solutions [9]. When instructors include these ideas in their curriculum, they show the next generation of humankind how to conserve energy and avoid waste and encourage a broader shift towards responsible use of digital resources that may or may not directly impact our environment. This theme of mindful use of technology extends to personalised learning as well. Adaptive and self-paced environments allow students to advance through content at different speeds and using different learning approaches or modalities, focusing on their challenges while receiving tailored support [10]. The latter fosters independence, promotes equity, and leads students to work more efficiently toward their academic goals, always with an eye on genuine skill development.

The following categories of tools are described in the paragraph above:

- Environmental Impact
  Description. These tools and methods help faculty, staff, and students in higher education understand how digital technology affects the environment. They focus on reducing unnecessary digital use, saving energy, and limiting waste. They also address how online activities, like video streaming or data storage, can affect carbon emissions. By including these ideas in the curriculum, educators can guide students toward eco-friendly habits and more responsible digital choices.

- Personalised Learning
  Description. These tools are designed to create adaptive learning environments

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by enabling educators to tailor content and learning pace to each student's unique abilities and preferences; this personalized approach not only boosts student engagement and retention but also helps educators address diverse learning needs, fostering a more inclusive and efficient learning experience; adaptive platforms cater specifically to individual learning styles and requirements.

- SELF-PACED ACQUISITION OF FOUNDATIONAL SKILLS
  Description. Tools that enable educators to create safe and personalized learning environments where students can acquire skills; these tools use artificial intelligence to create a digital environment for language learning (including conversational practice), facilitate the acquisition of technical skills, provide suggestions for learning techniques, and support self-paced learning of basic programming knowledge and skills; additionally, these tools help identify bugs in students' coding, provide instant feedback, and offer tailored answers to their questions.

Another trend worth mentioning here is interactive learning through AI-driven simulations. These simulations are used to create virtual spaces wherein it is possible to create life-like situations for students to practice various skills, making abstract theories more tangible (e.g. virtual reality system for immersive multi-user firefighter-training scenarios [11]). When learners can test solutions in a digital sandbox, they get immediate feedback on their choices and observe the effects of their actions and the introduced changes to the situated environment. A similar approach can be utilised in the context of academic research tasks. With the right AI-based tool, an educator or a researcher can sift through extensive studies in a fraction of the time it would take them to do it by hand or build advanced datasets for academic writing. Graduate students, in turn, can use these tools to refine theses, improve their written language and document structure, or design more thorough literature reviews, growing a richer understanding of their field along the way. These application examples must be taken with a grain of salt, as the tools are imperfect and may not always provide the best results. Hence, it is crucial to exercise critical thinking and verify the results obtained through AI-based tools.

The following categories of tools are described in the paragraph above:

- RESEARCH AND ACADEMIC WRITING
  Description. Tools that support literature reviews, data analysis, academic writing, and research design across various research domains; these tools assist educators with research tasks, help organize content efficiently, and ensure academic integrity.

- SIMULATIONS AND INTERACTIVE LEARNING
  Description. Tools for creating immersive environments that simulate real-world scenarios by educators; tools designed to provide students with immersive, hands-

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on experiences by recreating real-world scenarios in a controlled, virtual environment; they enable educators to create environments to practice skills, explore complex concepts, and solve problems in a risk-free setting by students, fostering deeper understanding and engagement

- VIRTUAL TEACHING ASSISTANTS
  Description. Tools assisting educators with communication, such as ChatGPT or Bard; these tools assist educators by providing personalized help, explanations, and feedback, helping them understand complex concepts or complete tasks; AI tools assist educators in administrative tasks, grading, and classroom management.

These categories underline how AI-based tools work best in education when the underlying models and algorithms align with solid pedagogical aims. Indeed, a virtual assistant might reduce the time needed to prepare class materials, but actual teaching depends on human insight and empathy. More so, preparing an AI-based tool for a specific course or lecture might take longer than preparing more traditional course materials. However, the prospect of providing students with a richer learning experience is a rewarding feature of the finalised product. In addition, an AI-based collaboration platform might help a class stay organised or motivate interaction, but meaningful dialogue and intellectual curiosity remain essential to higher learning. The advantage of using these tools is that they may help fight redundant, repetitive, and uninspiring tasks of solving various logistic obstacles of planning lessons or managing data, thus letting faculty members spend more time connecting with learners and focusing on outcomes that truly matter.

Ultimately, the collection of AI-based tools presented here in Sec. 1.4 aims at providing the perspective of an evolving classroom, where the role of technology is to support educators rather than overshadow them. By embracing the help of these tools in enhancing the ways to assess learners and teachers alike, collaborate in teams, create content, and safeguard data, teachers and students gain new media for growth. The motivation for designing and defining these categories – and the reason they resonate with DigComp 2.2 – is that technology should serve as an enabler, especially within the context of this project and higher-education institutions. AI-based and related tools should open doors for active participation, ethical use, and deeper engagement while leaving space for human creativity and critical thought.

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Heatmap

The heatmap we present here shows, in one sweeping view of Fig. 1.3, how each AI-based tool presented in Sec. 1.4 connects to the DigComp 2.2 competencies (described and presented in Sec. 1.1) and how its functionality lines up with Bloom's taxonomy levels [12], [13]. These competencies, grouped by colour in their respective areas, from Information and Data Literacy to Problem Solving and Safety, are laid out across the horizontal axis, visible at the bottom and the top of the graphic. The set of AI-based tools runs along the vertical axis. Within that grid, each cell has a colour- and pattern-coded marker that reflects the tool's degree of alignment with a given DigComp competency, using Bloom's taxonomy, where 0 (white tile) designates no perceived overlap, and 6 represents the highest Bloom's taxonomy level of *creating*. An utterly white cell means the tool is not applicable in that particular spot, i.e. it cannot be related to the observed competency on any of Bloom's taxonomy levels, whether because it does not address the competency or because its features serve another purpose. A value of one refers to a *remembering* function, while two suggests *understanding*. Three indicates *applying*, four corresponds to *analysing*, five points toward *evaluating*, and six signals *creating*. Though arranged in ascending order, these six levels should not be seen as strict hierarchies but more as a spectrum of thinking skills that each level requires from learners [13].

Even at a glance at the heatmap in Fig. 1.3, it can be observed that specific tools are related to higher levels of Bloom's taxonomy in specific competencies. Some might be strong at *creating* in the area of Digital Content Creation. Others might shine at *applying* or *analysing* within Problem Solving or Communication and Collaboration. This visualisation system helps educators understand how different AI-based tools and software can be used in class activities, projects, or even in more advanced research tasks. The color-shaded and pattern-coded patches offer a simple but powerful way to understand a tool's most potent uses since Bloom's levels represent the range of cognitive engagement that a tool can help bring to students or teachers. For example, an AI program that helps students generate entirely new content for a research project might sit at level six for Digital Content Creation, indicating it fosters a high degree of creative output. In contrast, another tool might hold a solid place at level three or four, focusing on the application or analysis of data, which is extremely useful in a wide range of courses but not necessarily intended for the final creation of a completely original work. Therefore, Bloom's taxonomy levels should not be observed hierarchically and as a scale but as individual indicators of cognitive engagement.

The notion of Bloom's taxonomy goes back decades [12], to a time when educational theorists sought to categorise the complexity of learning tasks. It starts with remember-

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ing (the recall of facts), moves on to understanding (the ability to interpret those facts), and then heads into applying (putting knowledge to use in new scenarios). Analysing means breaking down problems or ideas into components; evaluating involves forming judgments based on criteria or evidence and creating stands on top at the highest level, where new products, concepts, or syntheses emerge. Though many educators still refer to these categories linearly, the learning process often spirals across these levels, moving forward and backwards as needed. The advantage of mapping them to AI-based tools is that the reader can quickly spot the types of mental activity a tool might prompt in real classroom or research settings. A data-visualisation tool may prompt plenty of analysis, while a text-generation tool may push toward creativity, but each can also support other forms of thinking if used imaginatively.

The heatmap's alignment with DigComp 2.2 ensures that we also see how these AI tools measure up against the set of key digital competencies that educators, students, and institutions require to navigate a complex digital landscape. Suppose a tool shows strong alignment in Problem Solving at a higher Bloom's level. That might be an ideal solution for a design-thinking module, a capstone project, or a lab environment where students tackle real-life challenges. Similarly, if a tool was designated with a zero value for a particular competency, it does not necessarily mean it lacks quality or value. Such a value means it probably does not focus on that specific area of digital competence, so educators should look elsewhere for that purpose. In many cases, one might notice partial alignment, where the heatmap indicates a moderate or medium level of propriety. That information can help one fine-tune lesson plans by integrating multiple tools that complement one another, ensuring broad coverage of the competencies a teacher might aim to foster in their course.

By reading the heatmap carefully, one can also notice which tools seem more appealing than others. These might feature a combination of remembering and applying levels in fields like Information and Data Literacy or show advanced levels in Communication and Collaboration, Problem Solving, or Safety. A single tool can span several DigComp areas, giving it a broad potential use in higher education. Seeing these patterns in a single graphic allows the instructor or administrator to make quicker, more informed decisions. They can match a tool's strengths with the goals of a particular module, a group assignment, or the overarching learning outcomes for the entire course.

In practical terms, using these AI-based tools should never be viewed as a way to avoid thoughtful engagement with the subject matter or learners. The essence of Bloom's taxonomy is that it emphasises the depth and type of thinking involved. A tool that fosters high-level "evaluation" or "creation" does not become a magic solution unless teachers and students wield it with discernment. The heatmap, therefore, stands as a reference point. Scanning it shows whether a tool might help novices learn basic

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concepts, give intermediate students a way to apply and analyse material, or let advanced groups of learners produce highly original work or in-depth evaluations. It is one more layer of information, but an important one because it cuts across both digital competence and cognitive complexity.

Ultimately, this graphic encourages the reader to step back and see the bigger picture. The DigComp competencies on one axis remind us how each tool aligns with the essential areas of digital life and learning. The vertical listing of AI-based tools reveals, at a glance, a set of distinct functionalities. Bloom's taxonomy levels detail the specific type of thinking or learning moment that each tool best supports. This combination gives the user the power to choose technologies more precisely and clearly. It reminds us that not every tool suits every goal and helps us spot where the synergy might spark new approaches to emerge. Finally, the heatmap is there to guide educators in the quest to orchestrate robust, meaningful learning experiences, leveraging AI in ways that align with sound pedagogical principles and the evolving demands of today's digital world.

AI-Based Tools

Universities worldwide are pushed to transform their classrooms, lecture halls, and activities by applying artificial intelligence in fresh and creative ways. The tools explored in this section are not aimed at simply adding flashy tech for its own sake but rather at offering practical help to faculty and students to enhance and evolve their teaching and learning activities and processes. They do so by encompassing application domains, including but not limited to research, content creation, and collaboration, all in a user-friendly manner. Each tool is described with its name and a concise description. Furthermore, an example is given to show how it is supposed to work in a real scenario. Then, whether the tool is free to use, works on a freemium plan (providing some features for free but charging for more advanced features), or is wholly located behind a paywall, and whether it can be considered easy to use or fair to use. Because technology can be stressful when it complicates learning, we excluded tools that might leave casual users feeling lost so that only easy or fair options can be found here, with difficult-to-use tools omitted. Therefore, nothing here will likely cause undue frustration when ease of use is considered.

What matters in higher education is that the technology provided by the selected tools becomes a resource for educators who want to improve lessons in a way that supports, rather than replaces, their teaching style. Although each described tool has its flair and features that make it different from the others, they can usually be used to implement more transparent communication, smoother collaboration, or enhanced

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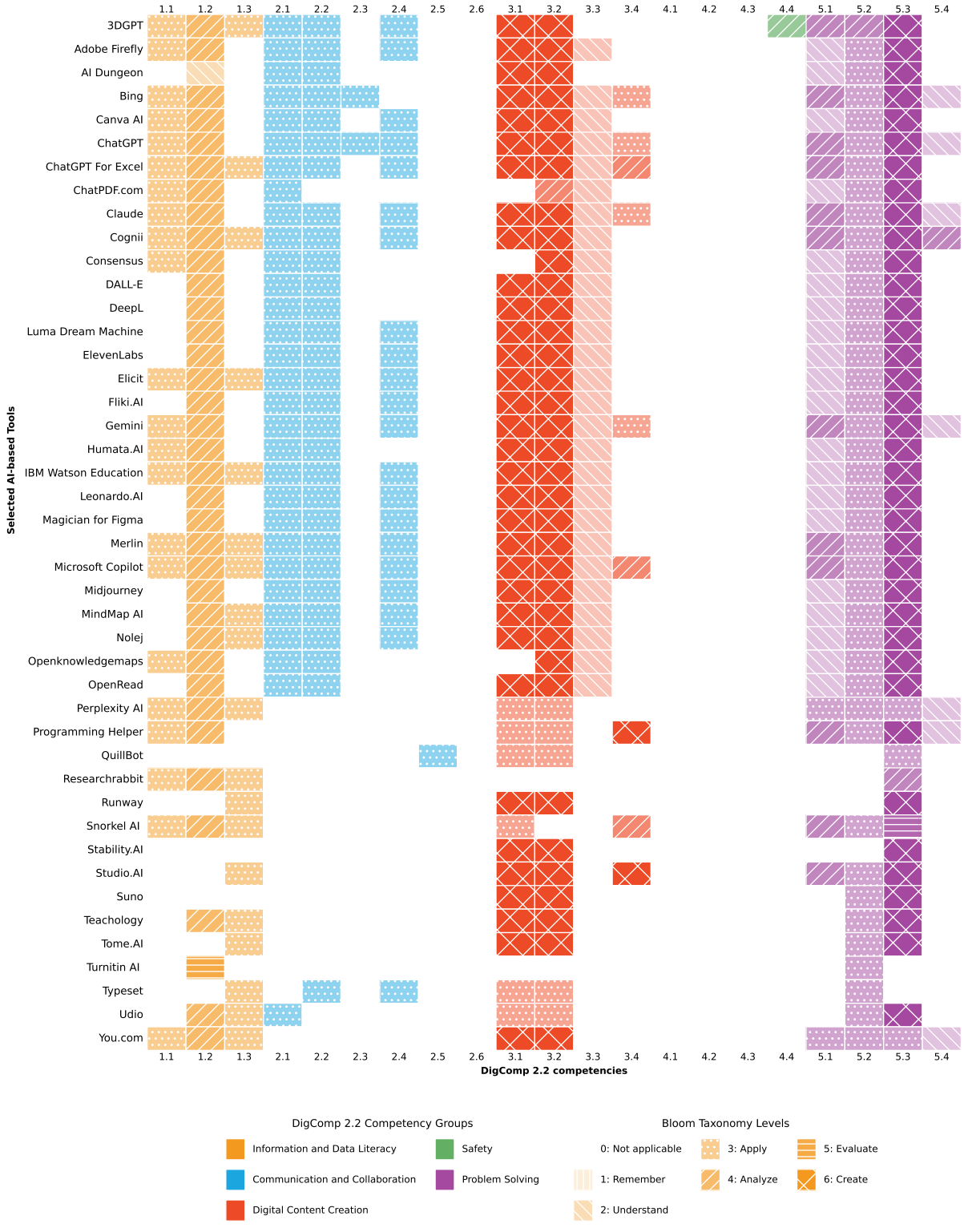

Figure 1.1: Heatmap mapping AI-based tools to DigComp 2.2 competencies with Bloom's taxonomy levels from 0 (not applicable) to 6 (create).

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student engagement. By observing and testing each tool's particular features, faculty members can choose the right software for each course and situation, confident that all the pieces of information – the tool's aim, real-world application, cost structure, and how difficult or simple it is to get started – are laid out straightforwardly. We strongly believe that that sense of clarity matters, especially for the teachers who want to spend their energy not on wrestling with complex software but on building better lesson plans and engaging student activities. Students, for their part, can experience more dynamic teamwork activities, up-to-date research support, and improved and more timely feedback loops, all of which help achieve learning outcomes and create a sense of deeper understanding and motivation for their course.

In order to avoid using modern tools as mere gimmicks, the tools listed here have been selected to tackle meaningful tasks in the educational environment. They might assist with analysing large datasets, generating cohesive ideas for written assignments, simplifying the steps of a group project, guiding multimedia content creation, or facilitating administrative work. Depending on the course's goals, faculty members can see which solution best fits the teaching challenge they are prepared to tackle. A language-focused course might benefit from AI-based tools that support translation or textual analysis. In contrast, an engineering class might benefit from design and simulation tools that speed up the process of building models. Regardless of the exact field, these tools and platforms are meant to empower users, assisting them with activities that might otherwise unnecessarily take valuable time.

Within this section, the names of each tool appear in plain sight. The function of each becomes clearer when the example showcases how one might use it in everyday instruction or research. Sometimes, free tools (depicted using) might offer fewer features, while freemium services (depicted using) may unlock additional options for those who pay. Paid tools (depicted using) can, in some cases, feature advanced modules that justify the investment for larger or more specialised projects. However, faculty need to weigh such costs against their department's budget and the actual needs of their course. As for the user-friendliness scale, a tool tagged as easy (depicted using) should take little time to master, whereas fair (depicted using) should take little time to master, whereas fair indicates that the tool may need a short learning curve before educators feel comfortable. Even then, no one should shy away because fair tools often bring powerful functionality.

This introduction prepares the reader for the extensive list of tools that follow. By appreciating the nature and purpose of each of the included AI-based tools, discovering how they relate to practical scenarios, and noting both cost and ease of use, readers can find the right resource to enrich their teaching, support their research, and make learning more exciting for everyone involved. The tools are listed in alphabetical order, with each one providing a unique set of features and benefits that can be explored

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further by visiting the tool's website or by reading the full description in the following pages.

3DGPT

we recommend for simulations and interactive learning.

Free

Easy to use

Description. Authentise 3DGPT is an AI-powered tool designed to streamline additive manufacturing by offering instant, intelligent insights and solutions. It combines GPT-driven natural language processing with real-time manufacturing data to enhance decision-making, improve workflows, and reduce operational complexity in 3D printing processes.

Example. 3DGPT allows teachers to interact with 3D models through conversational queries, making complex concepts more accessible. In higher education, educators can use it to demonstrate intricate designs or mechanical components in disciplines like engineering, architecture, and science, enabling real-time analysis, visualization, and enhanced student understanding of 3D structures.

Alternative Text (Alt Text), ARIA (Accessible Rich Internet Applications) Roles, Color Contrast, Input Assistance, Keyboard Navigation, Mobile Accessibility, Readable Fonts, Semantic HTML, WCAG Compliance, Zoom Functionality

...

Adobe Firefly

we recommend for content creation and enhancement.

Freemium

Easy to use

Description. Adobe Firefly is a generative AI tool that empowers creators to produce stunning visuals, text effects, and designs with ease. Seamlessly integrated with Adobe's creative suite, it uses advanced AI to enhance creativity, enabling users to generate and customize content rapidly while maintaining professional quality.

Example. Adobe Firefly enables teachers in higher education to quickly generate custom visuals, text effects, and other design elements for their teaching materials. Educators can use it to create engaging presentations, visually enhanced lesson content, and unique digital resources, saving time while fostering a visually immersive learning environment for students.

Alternative Text (Alt Text), ARIA (Accessible Rich Internet Applications) Roles, Color Contrast, Input Assistance, Keyboard Navigation, Mobile Accessibility, Readable Fonts, Semantic HTML, WCAG Compliance, Zoom Functionality

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AI Dungeon

we recommend for content creation and enhancement.

Freemium 

Easy to use 

Description. AI Dungeon is an interactive storytelling platform powered by advanced AI, enabling users to create and explore limitless text-based adventures. It adapts dynamically to player input, offering personalized and immersive narratives in any genre, fostering creativity and endless possibilities.

Example. AI Dungeon enables educators to design creative, immersive learning experiences for students. Teachers in higher education can use it to craft scenario-based exercises, such as historical reenactments or ethical decision-making simulations, fostering critical thinking, creativity, and student engagement in disciplines like literature, history, and philosophy.

Keyboard Navigation, Mobile Accessibility, Readable Fonts

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Bing

we recommend for data and information management and evaluation.

Freemium 

Easy to use 

Description. Microsoft Bing AI is a cutting-edge search and conversational tool that utilizes advanced AI to provide precise answers, creative insights, and tailored assistance. By leveraging natural language processing and deep learning, it enhances web searches, generates contextual responses, and simplifies complex tasks. Integrated into Microsoft's ecosystem, it offers seamless functionality for both personal and professional use, delivering smarter, faster, and more intuitive online experiences.

Example. Bing enables teachers in higher education to streamline lesson planning, find reliable resources, and generate creative ideas for teaching materials. By leveraging its conversational capabilities and contextual insights, educators can efficiently research complex topics, create engaging content, and provide students with accurate, real-time information during classroom discussions.

Alternative Text (Alt Text), Color Contrast, Keyboard Navigation, Mobile Accessibility, Multilingual Support, Readable Fonts, Semantic HTML, TWCAG Compliance

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Freemium  Easy to use 

Canva AI

we recommend for content creation and enhancement.

Description. Canva Magic Design is an AI-powered tool that simplifies and accelerates the design process by generating professional-quality templates and creative suggestions. Whether for presentations, social media, or branding, it customizes designs based on user inputs, ensuring visually appealing and impactful results in seconds. This innovative feature makes design accessible and effortless for users of all skill levels, enabling creativity without compromising quality or efficiency.

Example. Canva AI helps teachers in higher education create professional-quality presentations, infographics, and course materials with ease. Educators can use it to quickly design visually engaging lecture slides, assignment templates, or learning aids, saving time while enhancing the visual appeal and effectiveness of their teaching resources.

Alternative Text (Alt Text), Color Contrast, Keyboard Navigation, Mobile Accessibility, Multilingual Support, Readable Fonts, Semantic HTML, Text and Background Customization, Transcripts for Audio Content, Volume Controls, WCAG Compliance, Zoom Functionality

...

Freemium  Easy to use 

ChatGPT

we recommend for language and natural language processing.

Description. ChatGPT by OpenAI is a powerful conversational AI tool designed to understand and respond to natural language inputs with precision and context-awareness. It assists users with tasks like drafting content, answering questions, brainstorming ideas, and more, offering a seamless blend of creativity and functionality. Ideal for both personal and professional use, ChatGPT delivers intelligent, human-like interactions that enhance productivity and engagement.

Example. ChatGPT supports educators in higher education by generating lesson plans, creating quiz questions, and providing explanations for complex topics. Teachers can use it to streamline administrative tasks, enhance classroom discussions, and design personalized learning materials, fostering a more efficient and engaging teaching process.

Customization Options, Keyboard Navigation, Mobile Accessibility, Multilingual Support, Readable Fonts

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ChatGPT For Excel

we recommend for productivity for students.

Freemium 

Fair to use 

Description. The AI-powered Workflows for Office app streamlines productivity by automating routine tasks and integrating intelligent solutions directly within Microsoft Office. It leverages AI to enhance efficiency, enabling users to simplify document management, data analysis, and collaboration. This tool is ideal for professionals looking to save time and boost productivity, seamlessly integrating advanced capabilities into familiar Office applications.

Example. ChatGPT For Excel integrates seamlessly into Office applications, providing educators with smart features like content generation, data analysis, and task automation. Teachers in higher education can use it to create dynamic lesson plans, automate grading spreadsheets, and generate engaging teaching materials, saving time and improving efficiency in managing classroom and administrative tasks.

Alternative Text (Alt Text), Color Contrast, Input Assistance, Keyboard Navigation, Readable Fonts, Semantic HTML, WCAG Compliance, Zoom Functionality

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ChatPDF.com

we recommend for data and information management and evaluation.

Freemium 

Easy to use 

Description. ChatPDF is an AI-powered platform that allows users to interact with PDF documents using natural language. By uploading a PDF, users can ask questions and receive answers directly from the content, making document review and analysis more efficient. With advanced AI capabilities, ChatPDF enables quick extraction of relevant information, making it a valuable tool for students, researchers, and professionals working with large documents.

Example. ChatPDF assists educators in higher education with lesson planning, content generation, and simplifying complex topics. Teachers can use it to create tailored learning materials, generate quiz questions, and provide instant support for student inquiries, enhancing classroom engagement and streamlining their teaching workflow.

Keyboard Navigation, Mobile Accessibility, Multilingual Support, Readable Fonts, Semantic HTML, Text and Background Customization, Zoom Functionality

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Claude

we recommend for language and natural language processing.

Freemium 

Easy to use 

Description. Claude AI, developed by Anthropic, is an advanced conversational AI designed to assist with tasks such as writing, summarization, data analysis, and brainstorming. With a focus on safety and reliability, it uses deep language understanding to deliver context-aware and human-like interactions. Ideal for both personal and professional use, Claude offers efficient, intuitive solutions to enhance productivity and decision-making while maintaining user-friendly engagement.

Example. Claude provides in-depth insights, content generation, and contextual assistance. Teachers in higher education can leverage Claude to draft course materials, generate detailed explanations for complex concepts, and create engaging classroom discussions, enabling a more efficient and interactive teaching process.

Keyboard Navigation, Mobile Accessibility, Multilingual Support, Readable Fonts, Zoom Functionality

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Cognii

we recommend for personalised learning.

Paid 

Fair to use 

Description. Cognii is an AI-powered educational platform that leverages natural language processing to deliver personalized learning experiences and intelligent assessments. Designed for educators and students, it provides real-time feedback, adaptive learning paths, and automated grading to enhance engagement and efficiency. Cognii's conversational AI promotes critical thinking and deeper understanding, making it a powerful tool for modern, interactive education across various subjects and levels.

Example. Cognii enhance educational experiences by providing personalized feedback and supporting open-ended learning assessments. Teachers can use Cognii to automate grading of essay-style responses, offer detailed feedback on student submissions, and support adaptive learning, allowing educators to focus on creating deeper engagement and improving learning outcomes.

Mobile Accessibility, Multilingual Support, Readable Fonts, Zoom Functionality

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Freemium  Easy to use 

Consensus

we recommend for inquiry and learning process facilitation.

Description. Consensus is an AI-driven research tool designed to extract and summarize insights from scientific literature quickly and accurately. By leveraging advanced natural language processing, it helps users find evidence-based answers to complex questions, streamlining the research process for professionals and academics. Consensus empowers informed decision-making by providing clear, reliable summaries from credible sources, saving time while enhancing the depth and quality of analysis.

Example. Consensus provides evidence-based answers by analyzing and summarizing scientific literature. Teachers in higher education can use it to quickly gather reliable data for lectures, design research-focused assignments, and guide students in conducting evidence-based studies, fostering a deeper understanding of research methodologies and critical analysis.

Mobile Accessibility, Readable Fonts, Semantic HTML, WCAG Compliance, Zoom Functionality

...

Paid  Easy to use 

Copilot

we recommend for collaboration and interaction.

Description. Microsoft Copilot is an advanced AI assistant seamlessly integrated into Microsoft 365 applications to enhance productivity and creativity. It leverages generative AI to assist with tasks such as drafting content, analyzing data, creating presentations, and automating workflows. Designed to simplify complex processes, Copilot empowers users to work smarter and more efficiently, offering intuitive, context-aware suggestions that save time and boost professional output across various applications.

Example. Microsoft Copilot is designed to enhance productivity and streamline content creation. Teachers in higher education can use Copilot to draft lesson plans, automate grading spreadsheets, and generate teaching materials, enabling them to focus more on student engagement and delivering effective instruction.

Alternative Text (Alt Text), Color Contrast, Customization Options, Input Assistance, Keyboard Navigation, Mobile Accessibility, Multilingual Support, Readable Fonts, Resizable Text, Semantic HTML, Text and Background Customization, WCAG Compliance, Zoom Functionality

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DALL-E

we recommend for content creation and enhancement.

Paid 

Easy to use 

Description. DALL-E by OpenAI is a cutting-edge AI tool that generates unique, high-quality images from text descriptions, revolutionizing creative workflows. It uses deep learning to interpret natural language prompts, producing visually stunning and imaginative results tailored to user specifications. Perfect for designers, marketers, and innovators, DALL-E simplifies the creation of custom visuals, offering endless possibilities for artistic and professional projects.

Example. DALL-E generates unique images from textual descriptions, enabling teachers to create customized visual content for their lessons. In higher education, educators can use DALL-E to design engaging lecture slides, generate illustrations for complex concepts, and develop creative visual aids for art, design, or interdisciplinary subjects, enhancing students' understanding and interest.

Mobile Accessibility, Readable Fonts, Zoom Functionality

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DeepL

we recommend for language and natural language processing.

Freemium 

Easy to use 

Description. DeepL Translator is a powerful AI-based language translation tool renowned for its accuracy and natural phrasing. It supports multiple languages, providing high-quality translations for both personal and professional use. With its user-friendly interface and advanced neural network technology, DeepL ensures seamless communication and understanding across language barriers.

Example. DeepL enables teachers in higher education to translate academic resources, create multilingual teaching materials, and support language learning courses, ensuring accessibility and enhancing cross-cultural understanding in the classroom.

Keyboard Navigation, Mobile Accessibility, Readable Fonts, Resizable Text, Semantic HTML, WCAG Compliance, Zoom Functionality

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KnowBe4

we recommend for cybersecurity awareness.

Paid 

Fair to use 

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Description. Description text

Example. Example description

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ElevenLabs

we recommend for content creation and enhancement.

Freemium 

Easy to use 

Description. ElevenLabs is an advanced AI tool specializing in natural-sounding voice synthesis and speech generation. It allows users to create realistic voiceovers, customize tones, and generate high-quality audio content for various applications like podcasts, audiobooks, and media productions. Leveraging cutting-edge deep learning, ElevenLabs delivers lifelike vocal performances with precision and flexibility, making it an essential solution for creators and businesses seeking professional-grade audio solutions.

Example. ElevenLabs generates realistic and expressive voiceovers from written text. Teachers in higher education can use ElevenLabs to create audio versions of lecture notes, develop engaging multimedia resources, and support students with diverse learning needs, including those who benefit from auditory learning formats.

Customization Options, Mobile Accessibility, Multilingual Support, Readable Fonts, Volume Controls, Zoom Functionality

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Elicit

we recommend for inquiry and learning process facilitation.

Freemium 

Fair to use 

Description. Elicit is an AI-powered research assistant designed to streamline evidence-based decision-making by analyzing and summarizing academic literature. It helps users quickly identify relevant studies, extract key insights, and organize findings, making the research process faster and more efficient. Ideal for academics, professionals, and organizations, Elicit enhances productivity and ensures informed decision-making through its intuitive interface and advanced natural language processing capabilities.

Example. Elicit is designed to streamline the process of finding and synthesizing academic literature. Teachers in higher education can use Elicit to quickly identify relevant studies, summarize findings, and generate evidence-based insights for lectures and course materials, saving time and enhancing the depth of their teaching content.

Keyboard Navigation, Mobile Accessibility, Readable Fonts, Semantic HTML, Zoom

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Functionality

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Fliki.AI

we recommend for content creation and enhancement.

Freemium 

Easy to use 

Description. Fliki is an AI-driven platform that transforms text into lifelike voiceovers and engaging videos. With a variety of natural-sounding voices and customizable video templates, it simplifies content creation for podcasts, tutorials, and social media. Fliki empowers users to produce professional-quality multimedia content quickly and effortlessly.

Example. Fliki AI converts text into engaging videos and voiceovers, making it easy for educators to create multimedia content. Teachers in higher education can use Fliki to design visually rich lecture materials, develop instructional videos, and create accessible content for online learning platforms, enhancing student engagement and comprehension.

Captions for Videos, Mobile Accessibility, Multilingual Support, Readable Fonts, Zoom Functionality

...

Gemini

we recommend for personalised learning.

Freemium 

Easy to use 

Description. Google Gemini is an advanced AI tool designed to integrate cutting-edge generative AI capabilities into search, productivity, and creative workflows. By combining deep learning with real-time data processing, Gemini provides users with personalized insights, creative content generation, and seamless task automation. Ideal for both individuals and businesses, it enhances efficiency, fosters creativity, and delivers smarter, context-aware solutions across a range of applications.

Example. Gemini enables teachers in higher education to create interactive learning activities, answer complex student queries in real-time, and streamline lesson planning, fostering a more engaging and efficient teaching process.

Mobile Accessibility, Multilingual Support, Readable Fonts, Zoom Functionality

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Humata.AI

Freemium  Fair to use 

we recommend for data and information management and evaluation.

Description. Humata.ai is an AI-powered tool that simplifies document analysis by providing instant summaries, answers, and insights from uploaded files. It streamlines workflows for professionals by enabling quick comprehension and data extraction from complex documents.

Example. Humata AI helps educators quickly extract insights and summarize key points from academic papers, PDFs, and other documents. Teachers in higher education can use Humata to streamline research preparation, create concise summaries for lectures, and provide students with focused insights, enhancing both teaching efficiency and content clarity.

Customization Options, Mobile Accessibility, Multilingual Support, Readable Fonts, Zoom Functionality

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IBM Watson Education

Paid  Fair to use 

we recommend for virtual teaching assistants.

Description. IBM Watson Education Classroom is an AI-powered platform designed to enhance learning experiences by providing personalized insights and recommendations. It supports educators with data-driven tools to tailor teaching strategies, improve student engagement, and streamline classroom management for better outcomes.

Example. IBM Watson Education Classroom assist educators in personalizing learning experiences and streamlining classroom management. Teachers in higher education can use Watson to analyze student performance, create tailored lesson plans, and provide individualized feedback, enabling a more efficient and impactful teaching process.

Mobile Accessibility, Readable Fonts, Semantic HTML, WCAG Compliance

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Leonardo.AI

Freemium  Fair to use 

we recommend for content creation and enhancement.

Description. Leonardo.ai is a powerful AI platform designed for creating high-quality,

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customizable visual content, including game assets, concept art, and digital designs. Using advanced generative AI, it empowers artists and creators to produce unique and professional-grade visuals with efficiency and precision. Leonardo.ai streamlines the creative process, making it an essential tool for professionals in gaming, design, and digital media industries.

Example. Leonardo AI helps educators generate high-quality visuals, illustrations, and designs tailored to their teaching needs. Teachers in higher education can use Leonardo to create engaging lecture materials, design interactive content, and develop unique visuals for presentations, enhancing the overall learning experience for students.

Color Contrast, Customization Options, Mobile Accessibility, Readable Fonts, Zoom Functionality

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Luma Dream Machine

we recommend for content creation and enhancement.

Freemium 

Easy to use 

Description. Luma Labs AI is an innovative tool that leverages advanced AI to create lifelike 3D visuals and immersive content from simple inputs. Ideal for creators, developers, and businesses, it simplifies 3D asset generation, enabling high-quality results with minimal effort. Luma Labs AI empowers users to bring their ideas to life quickly and efficiently, enhancing creativity across industries.

Example. Luma Labs AI enables teachers in fields like engineering, architecture, and biology to create immersive, interactive visualizations of objects and concepts, fostering more dynamic and engaging teaching experiences.

Mobile Accessibility, Readable Fonts, Semantic HTML, Zoom Functionality

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Magician for Figma

we recommend for content creation and enhancement.

Freemium 

Fair to use 

Description. Magician.design is an innovative AI-powered tool that enhances design workflows by generating creative ideas, illustrations, and content directly within design platforms. Tailored for designers, it uses advanced AI to automate repetitive tasks, suggest improvements, and bring imaginative concepts to life. With its seamless integration and intuitive interface, Magician.design empowers users to accelerate their

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creative process while maintaining high-quality and professional standards.

Example. Magician for Figma helps educators create visually compelling and interactive design elements tailored for teaching materials. Teachers in higher education can use it to design engaging presentations, develop dynamic visual aids, and enhance the aesthetic appeal of course content, making lessons more captivating and effective for students.

Mobile Accessibility, Readable Fonts, Zoom Functionality

...

Merlin

we recommend for productivity for students.

Freemium 

Easy to use 

Description. Merlin is an AI-driven productivity tool designed to streamline workflows by integrating intelligent automation and data analysis into daily tasks. It helps users manage information, generate insights, and automate repetitive processes, enhancing efficiency across various industries. With its intuitive interface and advanced capabilities, Merlin empowers professionals to save time and focus on high-value work, making it an essential tool for boosting productivity and decision-making.

Example. Merlin assists educators in automating repetitive tasks, managing workflows, and enhancing teaching efficiency. Teachers in higher education can use Merlin to organize lesson plans, generate summaries for complex topics, and streamline administrative tasks, freeing up time to focus on student engagement and effective instruction.

Mobile Accessibility, Readable Fonts, Zoom Functionality

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Midjourney

we recommend for content creation and enhancement.

Paid 

Fair to use 

Description. MidJourney is an AI-powered creative platform that generates stunning, high-quality images from text prompts, enabling users to visualize concepts effortlessly. Ideal for artists, designers, and innovators, it uses advanced generative AI to transform ideas into captivating visuals, tailored to user preferences. MidJourney enhances creative workflows by providing fast, customizable, and professional-grade results, making it a valuable tool for digital content creation and artistic exploration.

Example. MidJourney enables teachers in higher education to create custom illus-

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trations, visual aids, and concept art for subjects such as design, art history, or creative writing, fostering a more engaging and visually enriched learning experience.

Mobile Accessibility, Readable Fonts, Zoom Functionality

...

MindMap AI

Freemium  Fair to use 

we recommend for personalised learning.

Description. MindMap AI is an intuitive tool that combines AI with mind mapping to help users organize ideas, brainstorm, and plan effectively. It simplifies complex workflows by generating dynamic, visually engaging mind maps, enabling clearer thinking and better decision-making.

Example. MindMap AI helps educators create detailed and dynamic mind maps to visually organize and present complex ideas. Teachers in higher education can use MindMap AI to design course outlines, illustrate conceptual relationships, and facilitate collaborative brainstorming sessions, enhancing student understanding and engagement in subjects across disciplines.

Mobile Accessibility, Readable Fonts, Zoom Functionality

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Nolej

Freemium  Fair to use 

we recommend for generating interactive lessons, courses, and quizzes.

Description. Nolej.io is an AI-powered platform designed to transform content into interactive and engaging learning experiences. It enables educators and organizations to create personalized, adaptive learning materials quickly, enhancing knowledge retention and learner engagement.

Example. Nolej enables teachers in higher education to quickly convert lecture notes, research papers, or textbooks into dynamic learning resources, making lessons more interactive and accessible for students.

Customization Options, Mobile Accessibility, Multilingual Support, Readable Fonts, WCAG Compliance

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Free

Easy to use

Openknowledgemaps

we recommend for inquiry and learning process facilitation.

Description. Open Knowledge Maps is an AI-driven tool that visually organizes research topics into interactive knowledge maps, making it easier to explore and understand complex academic content. By clustering related papers and concepts, it provides an intuitive overview of the research landscape, helping users quickly identify key areas, connections, and insights. Ideal for researchers, students, and professionals, Open Knowledge Maps enhances discovery and promotes efficient, structured learning.

Example. Open Knowledge Maps visualizes academic research topics through interactive knowledge maps. Teachers in higher education can use it to help students explore research areas, understand connections between studies, and gain a comprehensive overview of complex subjects, making it a valuable resource for fostering critical thinking and research skills.

Mobile Accessibility, Readable Fonts, Zoom Functionality

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Freemium

Fair to use

OpenRead

we recommend for research and academic writing.

Description. OpenRead Academy is an AI-powered platform designed to enhance reading comprehension and learning through personalized insights and interactive tools. It helps users analyze texts, extract key information, and develop critical thinking skills, making it ideal for students and educators. By leveraging advanced AI, OpenRead Academy streamlines the learning process, fostering deeper understanding and engagement with complex materials while promoting efficient study practices.

Example. OpenRead enhance reading comprehension and engagement by providing interactive summaries and insights into academic texts. Teachers in higher education can use OpenRead to guide students through complex readings, highlight key concepts, and assess understanding, enabling a more efficient and interactive approach to academic learning.

Customization Options, Mobile Accessibility, Multilingual Support, Readable Fonts, Zoom Functionality

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Freemium Easy to use

Perplexity AI

we recommend for inquiry and learning process facilitation.

Description. Perplexity.ai is an advanced AI-powered search and answer engine that delivers precise, context-aware responses to user queries by analyzing vast amounts of data in real time. It combines cutting-edge natural language processing with intuitive design, making information retrieval faster and more efficient. Ideal for researchers, professionals, and everyday users, Perplexity.ai simplifies complex searches, offering reliable insights and fostering informed decision-making across a variety of topics.

Example. Perplexity AI enables teachers in higher education to support lesson planning, gather reliable academic sources, and provide students with clear, evidence-based insights, fostering a more informed and efficient teaching process.

Mobile Accessibility, Multilingual Support, Readable Fonts, Zoom Functionality

...

Paid Easy to use

Programming Helper

we recommend for productivity for students.

Description. Programming Helper is an AI-driven platform designed to assist developers with coding tasks, debugging, and learning new programming concepts. It simplifies complex problems by providing instant solutions, code explanations, and best practices, making it an essential tool for both beginners and professionals.

Example. Programming Helper enables teachers in higher education to create coding examples, explain programming concepts, and provide real-time solutions to student queries, enhancing the teaching process in computer science and related courses.

Mobile Accessibility, Readable Fonts, Zoom Functionality

...

Freemium Easy to use

QuillBot

we recommend for content creation and enhancement.

Description. Quillbot is an AI-powered writing assistant designed to enhance and streamline the writing process by offering tools for paraphrasing, grammar checking, and summarizing. It helps users improve clarity, tone, and style, making it ideal for students, professionals, and content creators. With its intuitive interface and advanced

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AI capabilities, Quillbot saves time while ensuring polished, high-quality writing tailored to individual needs.

Example. QuillBot enables teachers in higher education to assist students in refining their writing, creating concise summaries of complex materials, and crafting clear and effective communication for assignments and academic purposes.

Mobile Accessibility, Multilingual Support, Readable Fonts, Zoom Functionality

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Researchrabbit

we recommend for research and academic writing.

Free

Fair to use

Description. ResearchRabbit is an AI-powered platform that revolutionizes academic research by helping users discover, organize, and track relevant literature efficiently. It offers personalized recommendations, interactive visualizations, and real-time updates on related studies, streamlining the research process. Ideal for researchers and students, ResearchRabbit enhances productivity and fosters deeper insights by providing a dynamic, user-friendly approach to exploring scholarly content.

Example. ResearchRabbit helps educators explore academic literature and identify connections across studies. Teachers in higher education can use ResearchRabbit to streamline literature reviews, curate relevant resources for lectures, and guide students in exploring related research, enhancing the depth and efficiency of their academic teaching.

Mobile Accessibility, Readable Fonts, Zoom Functionality

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Runway

we recommend for content creation and enhancement.

Freemium

Fair to use

Description. Runway ML is an innovative AI platform that empowers creators to generate, edit, and enhance multimedia content, including images, videos, and animations. With its user-friendly interface and advanced machine learning tools, it simplifies complex creative tasks, making professional-grade content creation accessible to all.

Example. Runway enables teachers in higher education to develop visually engaging multimedia content for lectures, create dynamic instructional materials, and demonstrate AI-driven creative workflows in art, media, and design courses, fostering innovative learning experiences.

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Mobile Accessibility, Multilingual Support

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Paid

Fair to use

Snorkel AI

we recommend for data and information management and evaluation.

Description. Snorkel AI is a powerful platform that streamlines data labeling and model development through programmatic techniques. By leveraging AI-driven automation, it accelerates machine learning workflows, enabling rapid creation of high-quality training datasets for AI applications.

Example. Snorkel AI enables teachers in higher education to introduce students to advanced data science techniques, create labeled datasets for machine learning projects, and facilitate hands-on learning in AI and data-driven courses, enhancing practical understanding.

Mobile Accessibility, Readable Fonts, Zoom Functionality

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Freemium

Fair to use

Stability.AI

we recommend for content creation and enhancement.

Description. Stability AI is an innovative platform specializing in the development of open-source generative AI models and tools. It empowers users to create high-quality visual content, such as images and designs, from text prompts, fostering creativity and accessibility. With its focus on democratizing AI and promoting ethical innovation, Stability AI is a valuable resource for creators, developers, and professionals across various industries.

Example. Stability AI enables teachers in higher education to create customized illustrations, visual aids, and conceptual designs for art, media, and STEM courses, enhancing the visual engagement and creativity of their teaching materials.

Mobile Accessibility, Multilingual Support, Readable Fonts, Zoom Functionality

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Freemium

Fair to use

Studio.AI

we recommend for content creation and enhancement.

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Description. Studio AI is an intuitive platform designed to simplify the creation, prototyping, and deployment of AI-driven applications. With user-friendly tools, pre-built templates, and advanced machine learning capabilities, it empowers users to rapidly develop and customize AI solutions for various use cases. Ideal for both beginners and professionals, Studio AI streamlines workflows, fosters innovation, and accelerates the development of intelligent, impactful applications.

Example. Studio AI enables teachers in higher education to produce engaging lecture videos, design interactive tutorials, and create visually compelling course materials, enhancing the effectiveness and accessibility of their teaching.

Mobile Accessibility, Readable Fonts, Zoom Functionality

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Suno

we recommend for content creation and enhancement.

Freemium 

Fair to use 

Description. Suno is an advanced AI platform specializing in generative audio and speech technology, enabling users to create lifelike voiceovers and audio content with ease. Ideal for creators, developers, and businesses, it simplifies the production of high-quality audio, enhancing efficiency and creativity in various projects.

Example. Suno enables teachers in higher education to create audio-based learning materials, develop immersive sound environments for interactive lessons, and support students with auditory learning preferences, enriching the educational experience across various disciplines.

Mobile Accessibility, Multilingual Support, Readable Fonts, Zoom Functionality

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Teachology

we recommend for self-paced acquisition of foundational skills.

Freemium 

Fair to use 

Description. Teachology AI is an innovative platform designed to empower educators by streamlining lesson planning, grading, and student engagement through AI-driven solutions. It offers personalized teaching strategies, automated administrative tasks, and insights into student performance, enabling teachers to focus on impactful instruction. Teachology AI enhances classroom efficiency and fosters better learning outcomes, making it an essential tool for modern education.

Example. Teachology assist educators in optimizing lesson planning, automating

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administrative tasks, and personalizing student learning experiences. Teachers in higher education can use Teachology AI to create tailored course content, track student progress, and streamline grading processes, allowing for more efficient and impactful teaching.

Customization Options, Mobile Accessibility, Multilingual Support, Readable Fonts

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Tome.AI

we recommend for content creation and enhancement.

Freemium 

Fair to use 

Description. Tome is an AI-powered storytelling platform that helps users create dynamic, visually engaging presentations and narratives. By combining text, images, and multimedia seamlessly, it streamlines content creation for professionals, educators, and creatives, making storytelling more impactful and efficient.

Example. Tome enables educators to create visually stunning and interactive presentations with minimal effort. Teachers in higher education can use Tome to design engaging lecture slides, organize course content effectively, and create dynamic storytelling experiences, making their teaching materials more captivating and accessible for students.

Customization Options, Mobile Accessibility, Readable Fonts, Zoom Functionality

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Turnitin AI

we recommend for assessment and feedback.

Paid 

Fair to use 

Description. Turnitin's AI Detector is a powerful tool designed to identify AI-generated content in academic submissions, ensuring integrity and originality. Leveraging advanced algorithms, it provides educators with reliable insights to uphold academic standards and foster authentic learning.

Example. Turnitin AI enables teachers in higher education to evaluate the originality of assignments, detect potential misuse of AI in writing, and promote ethical academic practices, fostering a fair and accountable learning environment.

Mobile Accessibility, Readable Fonts, Zoom Functionality

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Freemium

Fair to use

Typeset

we recommend for research and academic writing.

Description. Typeset.io is an AI-powered platform designed to simplify and enhance the research writing process, offering tools for formatting, citation management, and collaboration. It automates complex tasks like journal submission formatting and provides a user-friendly interface for organizing and sharing academic work. Ideal for researchers, students, and professionals, Typeset.io streamlines workflows, ensuring high-quality, publication-ready documents with minimal effort.

Example. Typeset enables teachers in higher education to guide students in adhering to specific formatting styles, streamline the review process for research assignments, and ensure professional-quality submissions, enhancing the academic writing experience.

Customization Options, Mobile Accessibility, Readable Fonts, Semantic HTML, Zoom Functionality

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Freemium

Easy to use

Udio

we recommend for self-paced acquisition of foundational skills.

Description. Udio is an AI-powered learning platform designed to personalize and enhance educational experiences for students and educators. It offers adaptive learning paths, real-time insights, and interactive tools to improve engagement and outcomes. With its user-friendly interface and data-driven approach, Udio supports efficient teaching and learning, making it an essential tool for modern education.

Example. Udio helps educators create interactive and personalized learning experiences through dynamic content and real-time insights. Teachers in higher education can use Udio to develop customized course materials, track student engagement, and adapt lessons to meet individual learning needs, fostering a more engaging and effective educational environment.

Customization Options, Mobile Accessibility, Multilingual Support, Readable Fonts, Zoom Functionality

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Freemium

Easy to use

You.com

we recommend for data and information management and evaluation.

Description. You.com is an AI-powered search engine that offers personalized, ad-free search experiences while integrating advanced tools for productivity and creativity. It combines natural language processing with customizable preferences, allowing users to find information, generate content, and explore resources tailored to their needs. Designed for efficiency and privacy, You.com empowers users to search smarter and work faster in a seamless, intuitive environment.

Example. You.com enables teachers in higher education to gather reliable academic resources, generate ideas for course content, and provide students with tailored research guidance, enhancing both teaching preparation and classroom engagement.

Customization Options, Mobile Accessibility, Multilingual Support, Readable Fonts, Zoom Functionality

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Bibliography

[1] R. Vuorikari, S. Kluzer and Y. Punie, *DigComp 2.2: The Digital Competence Framework for Citizens EUR 31006 EN*. Luxembourg LU: Publications Office of the European Union, 2022, ISBN: 978-92-76-48882-8. DOI: 10.2760/115376.

[2] D. Assante, C. Fornaro, L. Laura, D. Pirrone, A. Gokdemir and V. Jecheva, 'Bridging the AI Knowledge Gap with Open Online Education in Europe,' in *Smart Technologies for a Sustainable Future*, M. E. Auer, R. Langmann, D. May and K. Roos, Eds., Cham CH: Springer Nature Switzerland, 2024, pp. 363–369, ISBN: 978-3-031-61905-2. DOI: 10.1007/978-3-031-61905-2_35.

[3] W. Alharbi, 'Mind the Gap, Please!: Addressing the Mismatch Between Teacher Awareness and Student AI Adoption in Higher Education,' *International Journal of Computer-Assisted Language Learning and Teaching (IJCALLT)*, vol. 14, no. 1, pp. 1–28, 01/01/2024, ISSN: 2155-7098. DOI: 10.4018/IJCALLT.351245.

[4] F. K. Fadlelmula and S. M. Qadhi, 'A Systematic Review of Research on Artificial Intelligence in Higher Education: Practice, Gaps, and Future Directions in the GCC,' *Journal of University Teaching and Learning Practice*, vol. 21, no. 06, 06 19/04/2024, ISSN: 1449-9789. DOI: 10.53761/pswgbw82.

[5] C. Pelletier, 'Against Personalised Learning,' *International Journal of Artificial Intelligence in Education*, vol. 34, no. 1, pp. 111–115, 01/03/2024, ISSN: 1560-4306. DOI: 10.1007/s40593-023-00348-z.

[6] Z. Kačič. 'Notice of Cyber Attack - Statement from the Rector of the University of Maribor,' Faculty of Tourism. (25/11/2024), [Online]. Available: https://www.ft.um.si/en/notice-of-cyber-attack-statement-from-the-rector-of-the-university-of-maribor/ (visited on 15/02/2025).

[7] U. M. Adanma and E. O. Ogunbiyi, 'Artificial Intelligence in Environmental Conservation: Evaluating Cyber Risks and Opportunities for Sustainable Practices,' *Computer Science & IT Research Journal*, vol. 5, no. 5, pp. 1178–1209, 5 21/05/2024, ISSN: 2709-0051. DOI: 10.51594/csitrj.v5i5.1156.

[8] Q. Wang, Y. Li and R. Li, 'Ecological Footprints, Carbon Emissions, and Energy Transitions: The Impact of Artificial Intelligence (AI),' *Humanities and Social Sci-*

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ences Communications, vol. 11, no. 1, pp. 1–18, 14/08/2024, ISSN: 2662-9992. DOI: 10.1057/s41599-024-03520-5.

[9] V. Bolón-Canedo, L. Morán-Fernández, B. Cancela and A. Alonso-Betanzos, 'A Review of Green Artificial Intelligence: Towards a More Sustainable Future,' *Neurocomputing*, vol. 599, p. 128 096, 28/09/2024, ISSN: 0925-2312. DOI: 10.1016/j.neucom.2024.128096.

[10] O. O. Ayeni, N. M. A. Hamad, O. N. Chisom *et al.*, 'AI in Education: A Review of Personalized Learning and Educational Technology,' *GSC Advanced Research and Reviews*, vol. 18, no. 2, pp. 261–271, 2 2024, ISSN: 2582-4597, 2582-4597. DOI: 10.30574/gscarr.2024.18.2.0062.

[11] P. Braun, M. Grafelmann, F. Gill, H. Stolz, J. Hinckeldeyn and A.-K. Lange, 'Virtual Reality for Immersive Multi-User Firefighter-Training Scenarios,' *Virtual Reality & Intelligent Hardware*, Computer Graphics for Metaverse, vol. 4, no. 5, pp. 406–417, 01/10/2022, ISSN: 2096-5796. DOI: 10.1016/j.vrih.2022.08.006.

[12] B. S. Bloom, Ed., *Taxonomy of Educational Objectives, Handbook 1: Cognitive Domain*. London UK: Longmans, 1956, vol. 1.

[13] L. W. Anderson and D. R. Krathwohl, Eds., *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. New York US-NY: Longman, 2001, ISBN: 978-0-321-08405-7.

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