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How to Support Teachers to Use AI in Teaching

Briefing report No. 2

by the European Digital Education Hub's squad on artificial intelligence in education

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Content

How to Support Teachers to Use AI in Teaching

Artificial intelligence (AI) technology has already moved from an emergent to a more advanced stage where people are trying to explore its affordances and discover new innovative usages. It became extremely clear that AI technology is here to stay, and teachers cannot ignore it anymore. How should offerings to educators be positioned, and which problems are we going to solve through AI usage? We will try to model the 5 Whys technique on how AI is making an impact on education, teaching and learning. The below sets of questions refer first to education in general and then to the teaching/learning process:

1) Why is AI making an impact on education, teaching and learning?
AI is making an impact on education, both for teachers and for students as it enables new forms of personalisation and learning through individual feedback and coaching. While there are concerns over academic integrity, there is also hope that AI will enable teachers to provide more personalised learning experiences for their students.

2) Why is personalisation important in education?
Every student is different in their abilities, interests and circumstances of learning. It is important to tailor learning experiences for each individual student. This task is incredibly difficult in large classes, when a teacher cannot provide real-time feedback for every student.

3) Why is real-time feedback valuable in education?
Real-time feedback helps students identify their strengths and weaknesses, adjust their learning strategies, and improve their performance. It allows them to focus on achieving educational outcomes most effectively.

4) Why is enhancing educational outcomes important?

Education provides students with the knowledge and skills they need to succeed in their personal and professional lives. Educational outcomes are designed in a way that improves students' future prospects and contributes to societal well-being.

5) Why is societal well-being important?

Providing students with high-quality education can help create a more just and equitable society, where everyone has the opportunity to reach their full potential regardless of their background or circumstances.

1) Why should teachers use AI in the classroom?

AI allows to provide real-time feedback and personalise learning experiences for students and can also support teachers in improving their learning designs for classes.

2) Why is it important to personalise learning experiences for students?

Personalisation allows to create individual learning paths and achieve educational outcomes most effectively. But for this, teachers need big amounts of data, as well as time to support multiple students.

3) Why is it beneficial for teachers to have access to real-time data and insights?

When teachers have real-time data and insights, they can adapt their teaching strategies to be most effective for a given student or a group of students.

4) Why can AI help teachers save time and reduce workload?

AI can assist with tasks such as grading, data analysis, and providing feedback, allowing teachers to focus on teaching and providing personalised support to their students.

5) Why is it beneficial for teachers to stay up-to-date with technological advancements in education?

Teachers can improve their skills and knowledge, making them more competitive and effective in their roles. It can also increase job satisfaction and motivation by providing opportunities for professional growth and development.

In the article "AI in education: added value or not?" Digisprong mentions some practical ideas and dilemmas about AI use in education. For example, educational applications driven by artificial intelligence can divide students into level groups, automatically correct exercises, and help beginner students with reading difficulties. But that also means teachers need to keep an eye on the results from AI to make sure the quality of the teaching process remains high. More examples can be found in the Briefing report No. 3 *"Use Scenarios and practical examples of AI use in Education"*.

Although AI is evolving rapidly, its abilities are still limited. Teachers' pedagogical and educational role remains important. Digisprong mentions several tasks which AI cannot perform well yet, like monitoring and giving feedback on higher thinking skills or collaboration, and it does not consider students' thought processes or intermediate steps. Today, most AI tools for education can only provide feedback on skill sets for which there are clearly defined "right or wrong" answers such as reading, writing, coding, and mathematics.

How Could Teachers be Supported?

How could AI support teachers?

AI can support teachers in their everyday practice, for example in:

- **Enabling personalised learning.** Using AI, teachers can create personalised learning materials for students regarding their strengths and weaknesses, students' pace and ability (e.g. gifted students or twice exceptional).
- **Offering feedback.** AI can help teachers provide immediate feedback to students. This can be useful or not as research shows (Sumeracki, 2022) but this is up to the teachers to decide.
- **Focusing on certain tasks.** AI can allow teachers to focus more on tasks like student engagement, student observation, formative assessment, etc.
- **Monitoring the class.** AI can be used to monitor the class and through frequent testing give a data-driven overview to the teacher about the students' content learning.
- **Having an overview of the learning process.** If AI is used for frequent testing, it could provide a great overview of the learning process of students or classes.
- **Teacher training.** In teacher training or preparation of substitute teachers for students of different age groups AI can, for instance, provide quick examples of pieces of text and adapt them to a given age level so the teacher can practice grading or correcting assessments for that target group of students. AI-based text tools could be used as instruments to train writing and creativity skills and critical thinking.
- **Planning learning.** AI-based apps can support teachers in the process of creating courses, course modules, units, or lessons.

How could AI support educational institutions?

AI, used at an institutional level, can support teachers in their everyday practice, for example in:

- **Interpreting testing data.** If hypothetically, the whole school does frequent testing with adaptive learning applications, maybe AI can be useful to create learning groups that are based on students' abilities and not anymore based on the biological age/class grade.
- **Personalised training models for groups of students and teachers.**
- **Predictive analysis of student achievement.** Providing early warning of students at risk

of failing to reach the required learning standards of their grade level and providing suggestions for support.

- **Support in academic writing of institutions official documents.**
- Recommending learning materials to support the teacher in their own professional development.

How could teachers be supported to teach with AI?

Teacher level

Teachers who want to teach with AI could be supported by:

- European School Education Platform & eTwinning communities
- European Digital Education Hub
- EU Teacher Academies
- Peer-to-peer connections
- possibility of virtual exchanges
- blended intensive programmes
- Projects such as AI for teachers
- Requirement (e.g., in procurement processes) to include teacher support materials and training opportunities in AI tools for schools

Institutional level

In order to support teachers in using AI in their daily professional life, institutions could:

- Allocate more time for professional development and planning.
- Give teachers access to applications dedicated to class management using AI.
- Implement AI at the organisational level. If, for example, educational institutions use AI for assessment and monitoring then they could consider leveraging the use of student achievement data in new ways, for example by supporting the creation of learning groups based on abilities or students' interest rather than age groups with the help of AI-driven organisational tools. It is important that educators would be part of planning such activities.
- Offering managerial-level support for integrating AI in a reflective and critical way to improve performance on certain tasks. Educational leaders and managers should reflect on: What is the support needed from the managerial level? What should principals do? How should they set goals? How should they organise shared learning of teachers in single schools? How can this be integrated

into pedagogical programs? What are the pitfalls, risks as well as ethical and law-related considerations?

- Provide incentives to teachers to upskill themselves, e.g., credits, certification and promotion.
- Organise open discussions and reflections with all educational stakeholders on legal/ ethical questions regarding technology usage in education.

National level

- Guidance on teacher competences to teach with, for and about AI. This could be included in the national recommendations for each curriculum (You may find more in *Briefing report No. 1 Teachers' competences*).
- Integrated learning scenarios: AI could be used as a tool to create more transdisciplinary approaches or to promote moments of vertical teaching or mixed classes. If given access to data and trained properly, it could be a tool to generate an overview of which content is taught in which class, which would make AI a useful tool to help teachers create integrated learning scenarios (like for integrated STEM teaching).
- Provide incentives to teachers to upskill themselves, e.g., credits, certification, promotion.
- AI, coding and statistics should be part of initial teacher education. At university level, educational leaders and program coordinators should start building teachers' training curricula by answering questions such as what the challenges for teachers of the future are, how AI will affect their jobs, and how they can use AI. This kind of training based on a future oriented perspective would be highly recommendable for initial teachers training.
- Offer professional development on AI in national catalogues for teachers trainings, e.g. the ones developed in North Macedonia, Serbia or Croatia

European level

- European programmes to support AI use in education, like Erasmus+
- Recommendations and guidelines to encourage AI use in education, like the Ethical guidelines on the use of artificial intelligence (AI) and data in teaching and learning for educators

How Could Teachers Start with AI in Education?

The TPACK framework highlights that the effective incorporation of technology to enhance student learning relies on three fundamental elements: content, pedagogy, and technology. To achieve a valuable teaching and learning experience, educators must possess thorough knowledge of the subject they teach, a strong grasp of effective teaching methodologies, and a good understanding of the technology they can use or abstain from using. In 2018, Punya Mishra's website upgraded the TPACK diagram, and included the context domain to emphasise the limitations and different circumstances teachers face while teaching. Besides these elements, it is important to note that integrating technology in classroom activities also requires some understanding of the cognitive process of learning.

Knowledge about the content

Educators can begin by utilising AI to expand their understanding of subject-related content. There are various AI applications that can offer descriptions of particular concepts, clarify them, and provide teachers with tailored explanations appropriate for their students' age level. Furthermore, AI-powered search engines can enhance the search experience by assisting teachers in finding information more quickly and efficiently.

Knowledge about underlying pedagogical models of educational applications

From the educational science point of view, caution regarding the underlying pedagogical models of educational applications and services is needed. For teachers, before using any AI-driven educational applications with students, it is essential to reflect on which theoretical constructs the pedagogical decisions are based on and how traceable these decisions are. Practical questions such as "Do I agree with the grades this system is automatically giving?" or "Is this AI-driven system shaping or producing the kind of learning practices I want my students to perform and pursue later?" can be useful (SURF 2022).

Secondly, the intended learning outcomes and educational goals of AI-driven educational applications and services require scrutiny. Before integrating any new technology in education teachers should ask themselves why they shall use it, what the intended learning outcomes and educational goals of AI-driven educational applications are. For example, if the goal is to develop learner agency and reflection skills, AI-driven educational technologies, which support critical thinking and independent working, could be integrated. Some AI tools rely

on specific schema or curriculum alignment, and teachers and schools should ensure that those are appropriate for the educational context in which they are situated (e.g., some may be aligned to US curriculum standards).

Eventually, it will be important for teachers to consider "which parts of the teaching tasks or learning processes could be substituted, enhanced and transformed through automatisation, algorithms and machines" (Vuorikari et al, 2020).

Understanding of the technology

When educators opt for a new technology to incorporate into their classroom, they must be conscious of its potential benefits and drawbacks to determine if it will hinder or augment the learning experience. By employing frameworks such as the SECTIONS model proposed by Bates for evaluating digital media, teachers can become more critical and adapt the tech tool to their specific context.

Understanding of the teaching context

Creating a conducive environment is crucial for a successful learning experience. Teachers need to recognise the strengths and limitations of the learning environment and evaluate whether AI technology is suitable for their context before designing their course. For instance, having a group of tech-savvy students but no internet and appropriate device access in the learning space would make the use of AI technology in the learning process impossible. Therefore, having an accurate and practical assessment of the available physical and human resources is indispensable for integrating technology into any educational process.

Knowledge about the cognitive processes

Learning with different tools activates different cognitive processes and thus teachers need to be aware of the ones that are related to AI integration.

As with all teaching activities, having an understanding of the cognitive learning process is crucial to select the appropriate pedagogical approach and technology to effectively support and enhance the learning activity.

With AI "[o]ur whole relationship with knowledge and skills has changed. The nature of work will also change so how we learn will changed." ('Donald Clark Plan B', 2023) "We have moved from Human Teachers and Human Learners, as a dyad to AI Teachers and AI Learners as a tetrad." ('Donald Clark Plan B', 2023)

With AI, teachers can engage their students in a more interactive and personalised manner, while simultaneously enhancing their own teaching methods. One of the key cognitive processes that AI can aid in is attention. As previously discussed, AI-powered tools can help teachers maintain students'

engagement level high by delivering personalised content, offering instant feedback, and providing adaptive learning experiences that are customised to each student's unique needs. Additionally, AI-supported learning can be beneficial in enhancing students' learning strategies.

Dual coding (Dual Coding) is an important strategy in learning. It refers to the concept of utilising multiple forms of stimuli to assist learners in encoding information more efficiently, thus making it easier to recall later. Visual and verbal stimuli are the two primary types of stimuli used in the classroom for this purpose. As AI apps can generate, for example, visual stimuli from verbal ones, they can be concurrently used to support students in better perceiving and processing information.

Retrieval practice (Retrieval Practice) is another cognitive process that can be strengthened using AI. Intelligent tutoring systems and other AI-powered tools can help students practice retrieving information, which improves memory consolidation and long-term retention. They can be useful tools for spaced repetition techniques (Spaced Practice) by integrating moments of reviewing material at gradually increasing intervals.

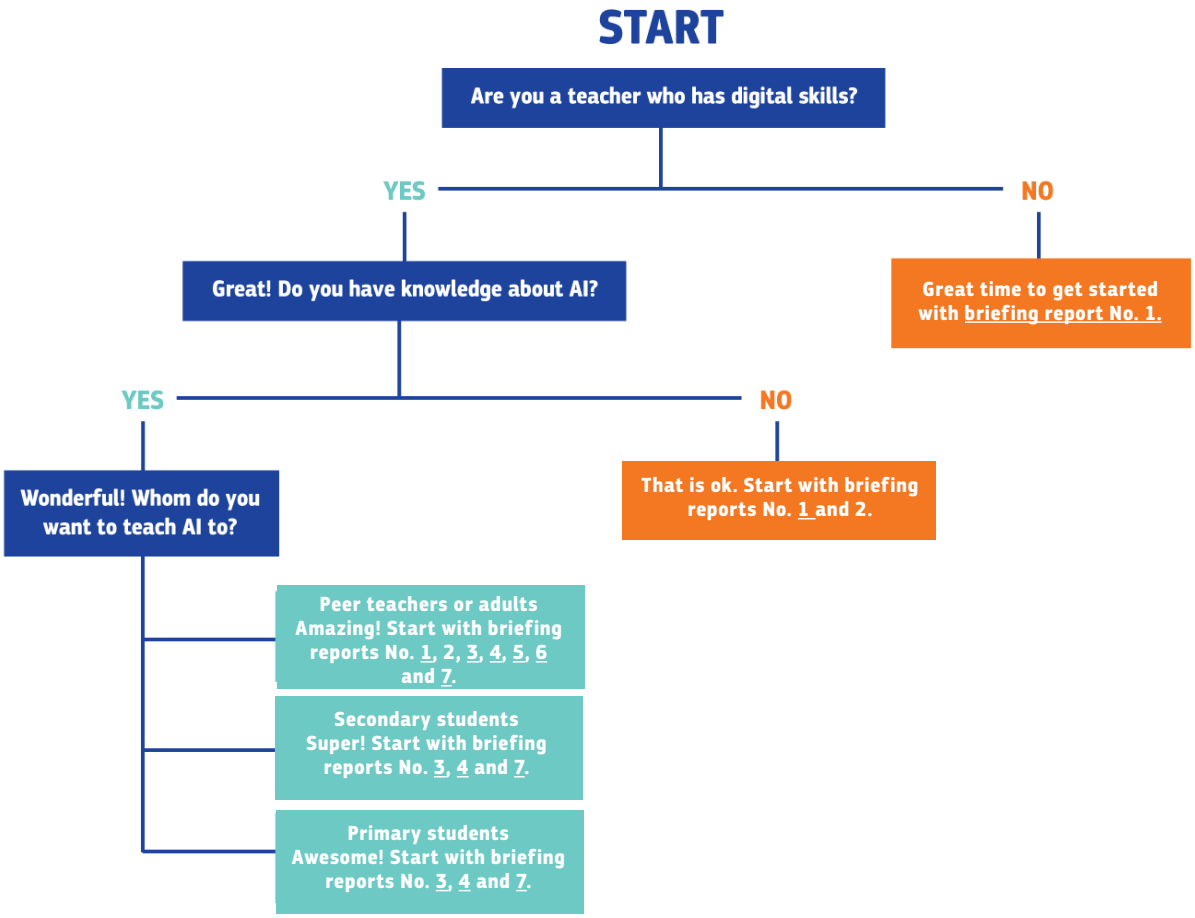
AI has several other ways to support students in learning, including exploring examples and linking them to the study topics. This will help them understand how the example is relevant to the concepts taught. Additionally, AI can generate different examples on the same topic that students can use to establish connections between them and enhance their problem-solving skills.

AI can help increase student motivation by providing personalised learning experiences, immediate feedback, and a sense of autonomy in their learning journey. By leveraging these cognitive processes, AI can play a vital role in supporting and enhancing learning outcomes in the classroom.

Finally, keeping in mind that metacognition is a critical cognitive process that can promote self-awareness and improve learning outcomes, AI-powered tools can help students become more aware of their learning strategies, strengths, and weaknesses, providing guidance on how to improve their learning outcomes.

Recommendations by the Squad

- Create an online course for school management on integrating AI at the school level to support education.
- Define “human-AI interface interaction skill”.
- Make recommendations for including “teaching with AI” in initial teacher education.
- Propose several professional development pathways for teachers to get acquainted with AI.
- Teachers who are wondering how to get started with AI could access this flowchart and find guidance depending on the choices they make.



Members of the EDEH squad on artificial intelligence in education who dedicated time for this briefing report: Cristina Obae, Yann-Aël Le Borgne, Francisco Bellas, Riina Vuorikari, Oksana Pasichnyk, Petra Bevek, Bertine van Deyzen, Ari Laitala, Madhumalti Sharma, Robbe Wulgaert, Jessica Niewint-Gori, Johanna Gröpler, Alexa Joyce and Lidija Kralj.

EDEH squad work around preparation of education for, about and with AI continues in briefing reports that follow.