AI PIONEERS

Supplement to the DigCompEDU Framework

OUTLINING THE SKILLS AND COMPETENCES OF EDUCATORS RELATED TO AI IN EDUCATION.

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AI Pioneers - Work Package 3

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EXECUTIVE SUMMARY

The supplement outlined in this document aims to build upon the existing DigCompEdu framework from the European Union[1] by integrating critical competencies relating to artificial intelligence (AI) in education. It recognises that AI is rapidly transforming teaching and learning processes, and Vocational and Adult educators need to be equipped with skills to understand, evaluate and utilise AI technologies effectively and responsibly.

The supplement examines the dual challenge of AI as a tool for training and learning but also a subject for learning in VET and adult education. To achieve this, the supplement aligns AI competencies to the six key areas of the DigCompEdu framework: Professional Engagement, Digital Resources, Teaching and Learning, Assessment, Empowering Learners, and Facilitating Learner's Digital Competence. For each area, it delves into how AI can be applied in that context, suggested activities for educators to develop relevant skills, proposed progression levels for competency building, potential challenges that may arise, and strategies to address them.

Some of the key AI competencies emphasised in the supplement include developing data literacy, computational thinking, curriculum design leveraging AI, ethical AI use, and preparing students for an AI-driven world. It adopted the same six-stage progression model from Newcomer to Pioneer used in the DigCompEdu framework to allow for consistency and integration.

The supplement highlights several challenges that need to be navigated when integrating AI in education. These include concerns around data privacy, algorithmic bias, unequal access to AI technologies, changing roles of educators, and the need for continuous professional development as AI evolves. It stresses the importance of developing ethical, human-centered, and responsible approaches to AI in teaching and learning.

Overall, the document provides a comprehensive guide for incorporating AI competencies into the skillsets of Adult and VET educators and trainers, equipping them to handle the emerging and transformative role of AI in diverse educational and workplace contexts. It aims to prepare educators to harness the promise of AI in enhancing learning experiences while mitigating risks through ethical and thoughtful integration.

1. European Framework for the Digital Competence of Educators: DigCompEdu , EUR 28775 EN, Publications Office of the European Union, Luxembourg, 2017

ABOUT THE PROJECT

The AI Pioneers project, under the ERASMUS+ Forward Looking Projects, is a multifaceted initiative aiming to integrate Artificial Intelligence (AI) into education, particularly in Adult Education and Vocational Education and Training (VET).

The project focuses on various aspects:

Impact of AI on Education: The project acknowledges the transformative power of AI across all economic and social sectors, including education. It is recognized that AI can accelerate the achievement of global education goals by reducing barriers to accessing learning, automating management processes, and optimizing methods to improve learning outcomes. The European Digital Education Action Plan's[1] strategic priorities align with the project's objectives, which include developing a high-performing digital education ecosystem and enhancing digital competences for the digital transformation.

Reference Network of AI Pioneers: A central component of the project is to establish a reference network of AI Pioneers, consisting of teachers, trainers, stakeholders, policymakers, and educational planners. This network will serve as a hub for the promotion and teaching of AI in Adult Education and Vocational Education and Training and it will act as a point of reference for the design and implementation of future AI-related educational projects at various levels.

Supplement to the DigCompEDU Framework: Another objective is to develop a supplement to the European DigCompEDU Framework, outlining the skills and competences of educators related to AI in education.

Development of Resources: The project aims to produce recommendations, toolkits, and implementation guidelines for AI Pioneers at both organizational and systemic levels. These resources will be disseminated to promote the use of AI in education and training.

1. https://education.ec.europa.eu/focus-topics/digital-education/action-plan

Ethical Guidelines for AI Use: The project will also focus on developing guidelines for ethical and trustworthy AI use in Adult Education and VET, in line with existing EU policies. This will include producing an evaluation schema and piloting these guidelines in practice.

Dissemination and Mainstreaming: The project includes a strong emphasis on disseminating its findings and mainstreaming its results into the wider educational landscape. This involves engaging participants in project activities and spreading the project results among other education providers, organizations, policymakers, and planners.

Project Management and Impact Analysis: The project consortium, composed of various organizations, will manage the project through a structured approach, ensuring smooth development and implementation. Impact analysis will measure the project's effects on target groups at local, national, and European levels.

Project partners

- Institute for Technology and Education (ITB), University of Bremen, (Germany) Coordinator
- Associação Universidade-Empresa para o Desenvolvimento - TecMinho (Portugal)
- Active Citizens Partnership, (Greece)
- Centre for Action Research in Vocational Education and Training - CARVET, University of Verona (Italy)
- University of the Basque Country (Spain)
- Pontydysgu (Spain)
- European Distance and E-Learning Network - EDEM (Estonia)
- Federal Institute for Vocational Education and Training - BIBB(Germany)
- Centre for Social Innovation (Cyprus)
- CNOS-FAP Federation (Italy)

www.aipioneers.org

INTRODUCTION TO AI IN EDUCATION

A brief introduction to AI

Artificial Intelligence (AI) is a field of computer science that focuses on creating systems capable of performing tasks that typically require human intelligence. These tasks include learning, reasoning, problem-solving, perception, and language understanding. AI is a broad discipline, encompassing various approaches and technologies. Here's a brief overview:

Key Concepts in AI:

- Machine Learning (ML): A subset of AI where systems learn and improve from experience without being explicitly programmed. It involves algorithms that can analyse and interpret data, make predictions, and improve over time.
- Neural Networks: Inspired by the human brain, these are a series of algorithms that mimic the operations of a human brain to recognise patterns and solve common problems in the fields of AI, machine learning, and deep learning.
- Natural Language Processing (NLP): This involves the interaction between computers and humans using natural language. The ultimate objective of NLP is to read, decipher, understand, and make sense of human languages in a valuable way.
- Robotics: A field of AI that involves the creation and operation of robots, which can be used to perform tasks that are dangerous, repetitive, or difficult for humans.

Technologies in AI:

- Deep Learning: A technique for implementing machine learning that uses neural networks with many layers. It is particularly powerful for tasks like image and speech recognition.
- AI Algorithms: Various algorithms are used for pattern recognition, classification, regression, and clustering, such as decision trees, support vector machines, and k-means clustering.
- Cloud AI: Leveraging cloud computing to provide AI services and computing power, enabling businesses and individuals to access AI capabilities without investing in expensive hardware.

Role of AI in Education

A recent published policy report from the Joint Research Centre (JRC) of the European Commission titled “On the Futures of Technology in Education: Emerging Trends and Policy Implications" provides an insightful overview of how technological advancements, particularly in the realm of Artificial Intelligence (AI), are reshaping educational practices, processes, and organisations. The potential impacts of AI on education, as highlighted in the referenced document, are multifaceted and profound. These impacts span various aspects of the educational landscape, from teaching and learning processes to assessment and the broader organisational framework. Here are some key areas where AI is poised to significantly influence education:

AI as a Tool for Efficiency and Automation

AI is identified as a potential solution for reducing teacher workloads, particularly in tasks like marking student homework. By automating these repetitive and time-consuming tasks, AI can make teaching more attractive and allow teachers to focus more on teaching and less on administrative duties. This automation could transform formative assessment, enabling continuous feedback for students and making real-time assessment and personalised or adaptive learning possible.

Generative AI and Educational Transformation

The document highlights the significant impact of generative AI and foundation models on education. Generative AI technologies like automatic video captioning, translation, and video summarising can provide innovative opportunities for pedagogical enhancement and increased accessibility. These technologies can assist in developing 'smart companions' or 'learning partners,' shifting the focus from rote learning to metacognition and reflection. This entails a redistribution of agency between humans and machines, requiring careful consideration of the activities to delegate to AI.

Data-Driven Insights and Personalisation

AI's role in the datafication of education is emphasised, where large-scale data on education can reinforce and inform new pedagogical approaches, learning technologies, and education policy. The aspiration is to record learning processes rather than just outcomes to improve student engagement and attainment.

1. https://education.ec.europa.eu/focus-topics/digital-education/action-plan

However, ethical concerns about personal data processing and potential misuse, as well as reliance on infrastructures largely controlled by commercial entities, are critical issues to address.

Educational Policy and Governance
AI's integration into education raises questions about governance models and policy-making. It necessitates a reevaluation of educational policies to incorporate AI's capabilities and limitations. The document also calls for a holistic approach to embedding AI in educational systems, taking into account the potential future obsolescence of current technologies due to advances like quantum computing.

Challenges and Ethical Considerations
The document acknowledges the need for critical evaluation of AI's impact on education. It highlights the risks of widening the digital divide and the potential for commercial interests to dominate the sector. Regulating technological innovation to ensure diverse educational visions and connecting industrial policy with learning theories is crucial.

AI's role in education, as presented in the document, is both transformative and multifaceted, offering opportunities for enhanced efficiency, personalization, and innovation in teaching and learning. However, it also brings forth significant challenges and ethical considerations that need to be addressed to ensure equitable, effective, and responsible use of AI in educational settings.

AI in Adult and Vocational Education and Training

AI's integration into education raises questions about governance models and policy-making. It necessitates a reevaluation of educational policies to incorporate AI's capabilities and limitations. The document also calls for a holistic approach to embedding AI in educational systems, taking into account the potential future obsolescence of current technologies due to advances like quantum computing.

Educating about AI itself in adult and VET settings is becoming increasingly important as AI becomes more prevalent across various sectors. Integrating AI education into curricula involves not only teaching the fundamentals of AI and its applications but also delving into its societal impacts. This includes fostering critical thinking about AI's capabilities, limitations, and ethical dimensions, such as concerns around bias and privacy. Enhancing digital literacy is also a key component, as understanding how to interact with and interpret AI systems is becoming an essential skill in the modern workforce. As AI continues to evolve, the educational focus is shifting towards not only using AI tools but also understanding and critically evaluating them, preparing learners for a future where AI is an integral part of daily life and work.

Preparing the workforce for new skills in the age of AI is another crucial aspect of adult and VET education. AI's role in identifying emerging trends and predicting future skill requirements is invaluable. This insight allows educational programs to adapt their curricula to meet the evolving needs of the job market. Upskilling and reskilling become central themes, with AI-guided programs enabling adults and professionals to acquire new skills or update existing ones, thus staying in step with technological advancements. Moreover, AI-driven training ensures that learners are not just technically adept but are also prepared to work in AI-integrated environments. This preparation is key to ensuring that the workforce is ready for the challenges and opportunities presented by the rapidly advancing field of AI, making adult and VET education more relevant, effective, and aligned with future employment landscapes.

RESEARCH METHODOLOGY AND FINDINGS

Methodology

The research methodology included three main activities: examination of recent and relevant research, survey of teachers and trainers and interviews and discussions with key stakeholders. Research conducted the from March to October 2023.

The first step included a comprehensive examination of current and pertinent literature in the field of AI in education. This involved an extensive review of academic journals, conference proceedings, policy reports and other scholarly publications to gain a deep understanding of the recent advancements, challenges, and trends in the application of AI for teaching and learning.

The next phase of the methodology involved two primary data collection methods: surveys and interviews. Surveys have been administered to a diverse group of teachers and trainers, aiming to gather quantitative and qualitative data on their perceptions, and challenges with AI in educational contexts. Concurrently, in-depth interviews with key stakeholders, including educational policymakers, AI technology developers, and academic experts, have been conducted. These semi structured interviews were designed to capture a range of perspectives on the ethical, technical, and pedagogical aspects of AI in education.

Literature review

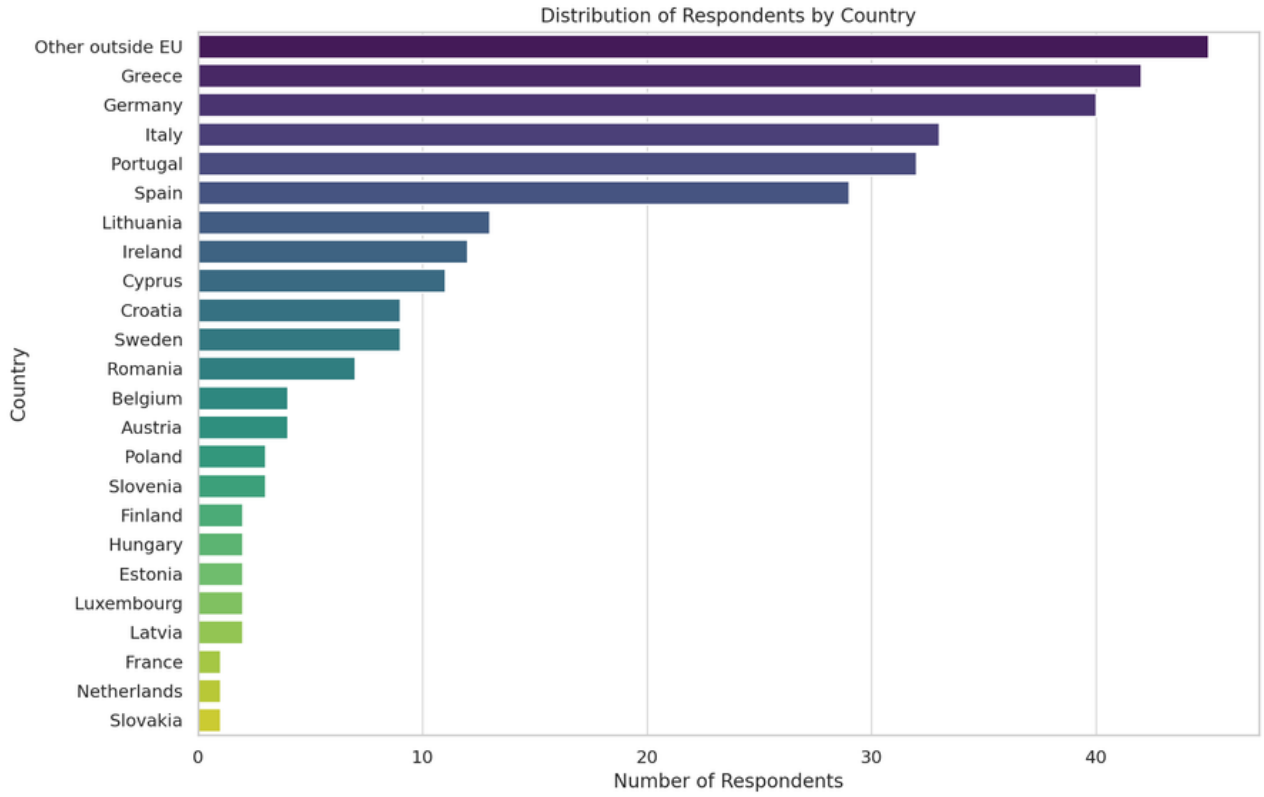
A comprehensive literature review focusing on the skills related to Artificial Intelligence (AI) necessary for educators in Adult Education and Vocational Education and Training (VET) reveals several critical competencies and areas of knowledge. One of the primary findings is the increasing need for educators to possess not just basic digital literacy, but also specific skills related to the understanding and application of AI technologies.

This includes knowledge of how AI systems operate, the ability to interpret and utilize data generated by AI tools, and the skills to integrate AI into curriculum and teaching strategies. The literature consistently underscores the importance of educators being proficient in using AI for personalized learning experiences, where they can leverage AI-driven analytics to adapt teaching approaches to individual learner needs. Moreover, there's a growing emphasis on the need for educators to understand the ethical implications of AI in education. This encompasses awareness about data privacy, algorithmic bias, and the ethical use of AI-generated student data, ensuring responsible and equitable use of AI in educational settings.

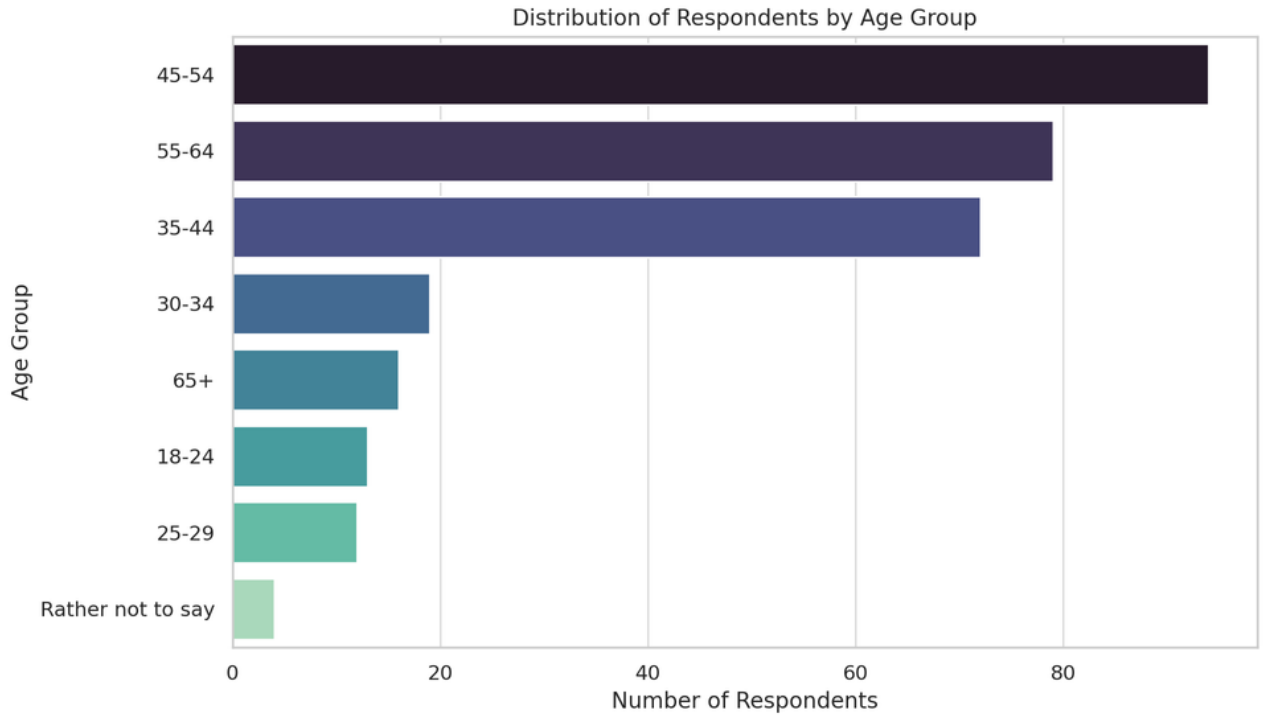
Another significant outcome from the literature review is the identification of a gap in current professional development programs for educators in the context of AI skills. Many existing training programs for adult and VET educators do not adequately cover AI technologies, resulting in a lack of preparedness to effectively use AI tools in teaching and learning. The literature suggests a need for comprehensive, ongoing professional development initiatives that are specifically tailored to equip educators with AI-related skills. Such programs should not only provide technical training in AI applications but also incorporate pedagogical methodologies for integrating AI into teaching practices. Additionally, there is a call for collaborative efforts between educational institutions, AI technology providers, and industry partners to ensure that the training is relevant and up-to-date with the latest AI advancements. This collaboration is seen as crucial for preparing educators to meet the evolving demands of the workforce and to effectively train students in skills that are increasingly essential in an AI-driven job market.

Survey of teachers and trainers

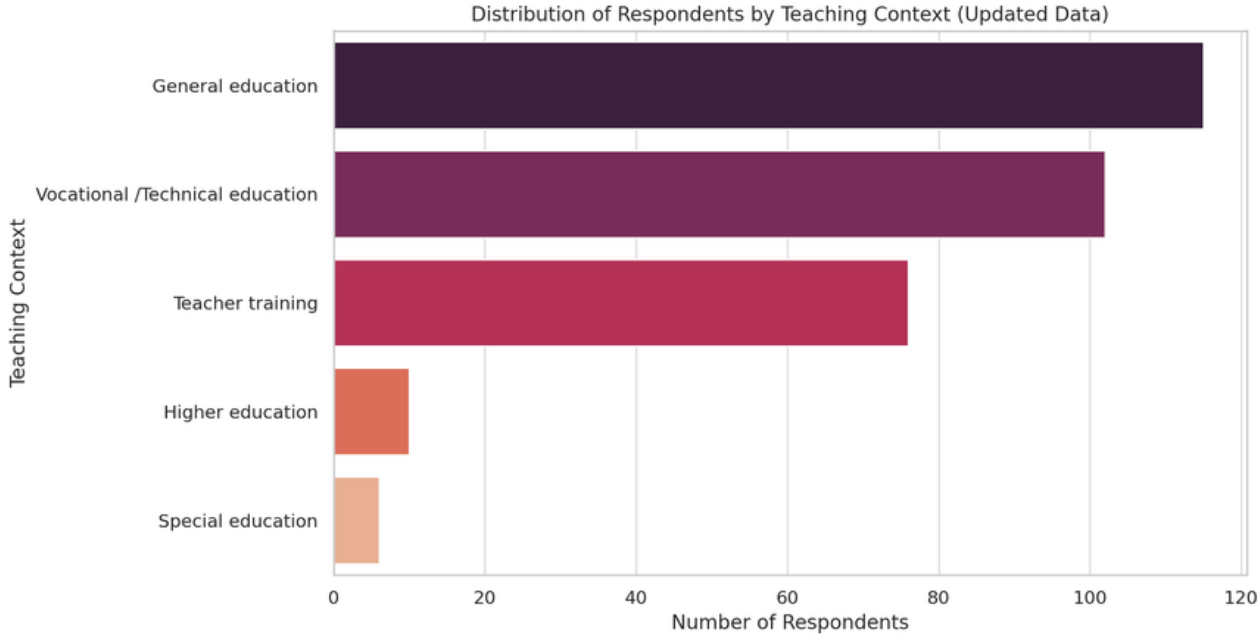
The survey was conducted from June to October 2023, with the participation of 310 teachers and trainers. We observed significant geographic diversity among the survey participants: 265 were from EU countries, and 45 from countries outside the EU. We received at least one response from 25 out of the 27 EU countries. Countries where project's partners are based had the highest representation.



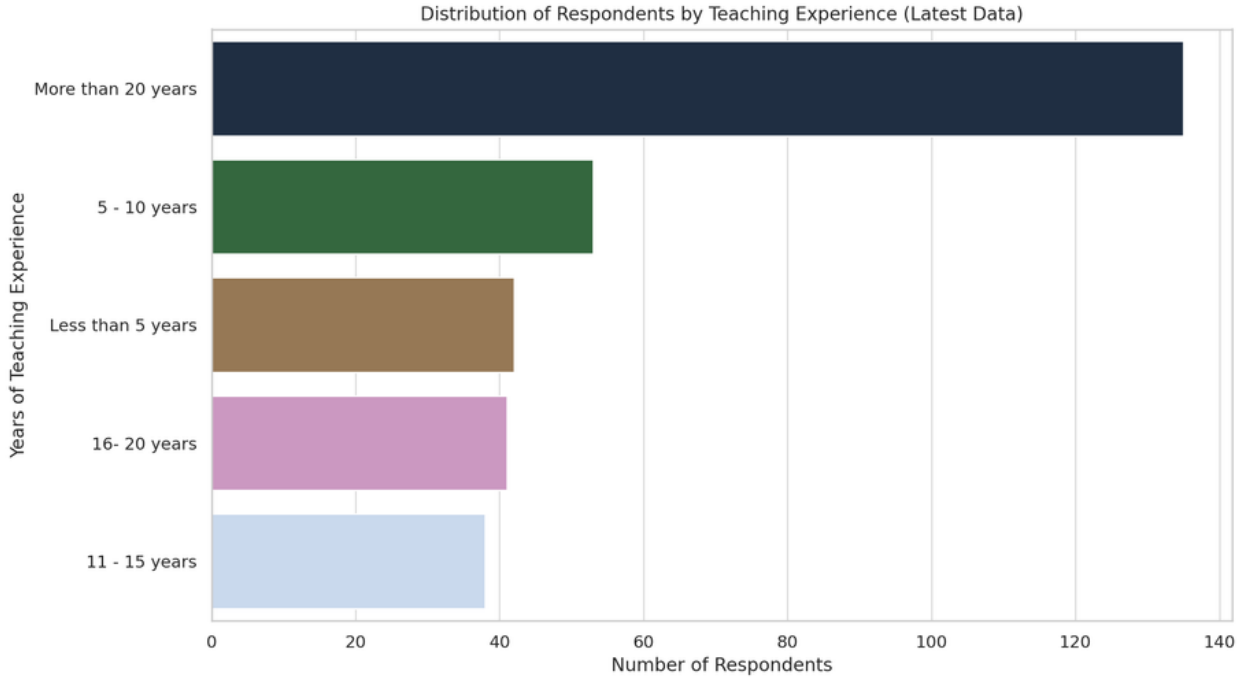
In terms of age distribution, the survey saw a predominant representation from those aged 35-64 years, particularly the 45-54 age bracket. Additionally, both younger (18-29 years) and senior (65+ years) educators contributed, offering insights across a broad age spectrum.



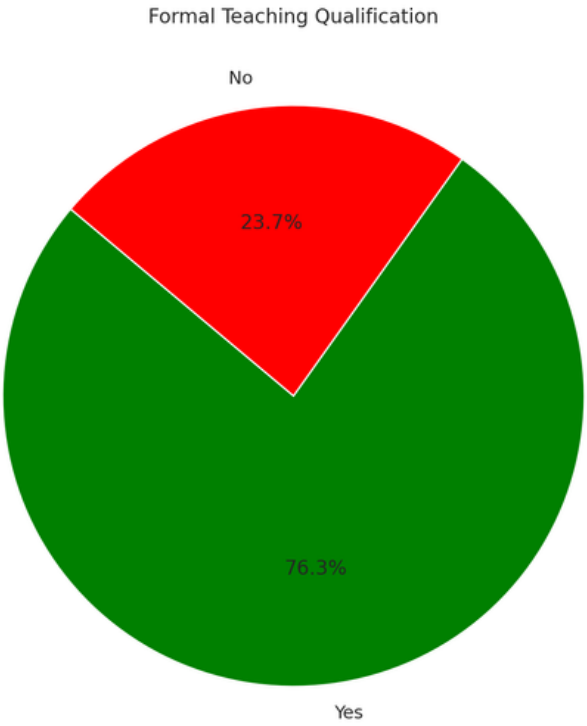
The majority of respondents were from the General education (this includes adult education) , though there was also a notable presence of professionals from Vocational Education and Training (VET) and Teacher training. This variation in educational sectors brought together a range of experiences and backgrounds, enriching our understanding of AI use across different educational environments.

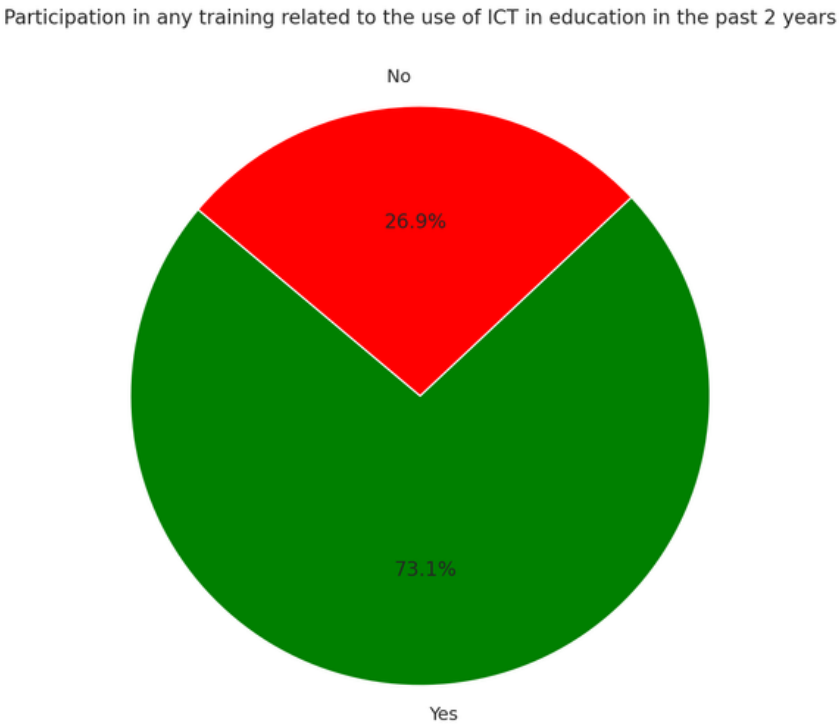


Experience levels among participants varied, with many having over 20 years in teaching. Educators with intermediate (5-20 years) and less than 5 years of experience were also well-represented, providing a mix of veteran and fresh perspectives in the field.



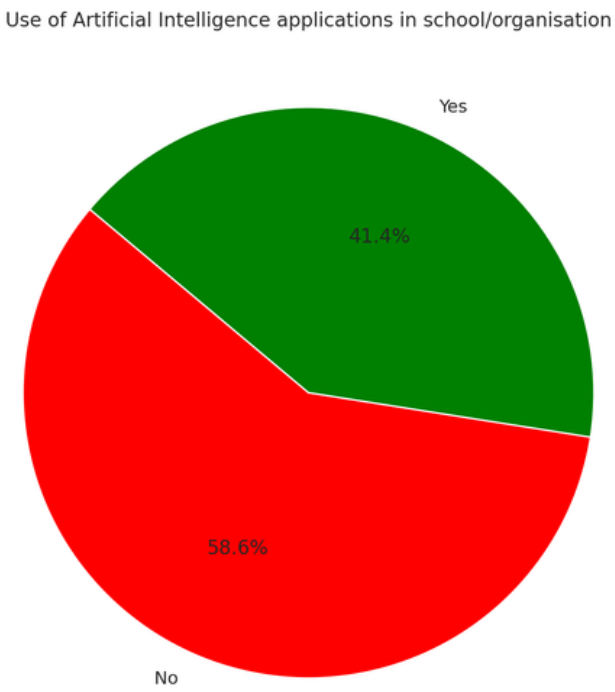
The majority of survey participants (76.3%) have a formal teaching qualification, highlighting their professional background in education. The diversity in responses also suggests a range of educational and professional experiences among the participants.





The 73.1% of educators have engaged in training related to ICT use in the past two years, demonstrating an active involvement with technology in educational contexts.

While a larger proportion of respondents reported their schools or organisations do not yet use AI applications, a considerable number are experimenting with AI technologies, signaling an emergent interest and adoption in educational settings.



The respondents of the survey mentioned a variety of Artificial Intelligence applications that their schools or organizations are using. Here's a list of some of these applications, as reported in the survey responses:

- ChatGPT (various versions, including 3.5 and 4)
- Midjourney
- Google AI Tools
- Microsoft Bing
- Generative AI tools (e.g., text and image generation)
- Chatbots for academic and administrative purposes
- DeepL translation
- Educational tools like Turnitin, Wooclap
- Optimization and plagiarism detection tools
- Learning analytics tools

It's important to note that some responses might include general categories of AI applications or tools integrated into other systems, indicating a wide-ranging use of AI in various aspects of education.

This list provides a glimpse into how widespread the adoption of AI technologies is in educational settings, from enhancing teaching and learning processes to administrative and research applications.

A significant majority of the participants' schools or organisations do not have a specific policy on AI. Additionally, a substantial number of respondents are uncertain about the existence of such a policy. This highlights that while AI is being adopted in educational settings, many institutions may not yet have formal policies in place to govern its use.

Main challenges in developing and using AI technologies in education

The survey asked participants about their views on the main challenges in developing and using AI technologies in education. The challenges were divided into several categories. Here's a summary of the responses:

Lack of Data:
Responses vary across several categories, with a notable number agreeing or fully agreeing that it is a challenge.

Bias and Fairness:
This category also shows a diversity of opinions, with many participants acknowledging it as a significant challenge.

Technical Complexity:
A considerable number of participants seem to agree or fully agree that technical complexity is a challenge.

Ethical Considerations:
This appears to be recognized as a major challenge, with a high number of participants expressing agreement.

Limited Access and Adoption:
Participants generally agree or fully agree that this is a challenge.

Resistance to Change:
There's a recognition among participants that resistance to change is a challenge in the development and use of AI in education.

Each of these categories received a range of responses, from strong agreement to disagreement, indicating a varied perception of these challenges among the participants. The most notable challenges seem to be ethical considerations,

technical complexity, and limited access and adoption, which received a higher level of agreement among the participants.

Skills needed to incorporate AI into teaching practices

The survey explored various skills that educators believe are necessary to incorporate AI into their teaching practices. Here's a summary of the responses for each skill category:

Data Literacy:
A significant number of participants fully agree or totally agree that data literacy is essential.

Computational Thinking:
This skill also received a high level of agreement, indicating its perceived importance.

Ethical Considerations:
A majority of the respondents agree or fully agree that understanding ethical considerations is crucial.

Collaboration and Communication:
Many participants believe that skills in collaboration and communication are important.

Technical Skills:
Technical skills are also seen as necessary, with many educators fully agreeing on their importance.

Curriculum and Pedagogy:
Skills related to curriculum development and pedagogical approaches specific to AI received a high level of agreement.

The responses indicate a strong consensus among educators that a range of skills, including both technical and non-technical abilities, are crucial for effectively incorporating AI into teaching practices. Data literacy, computational thinking, and ethical considerations are among the most emphasised skills, highlighting the multifaceted nature of AI integration in education.

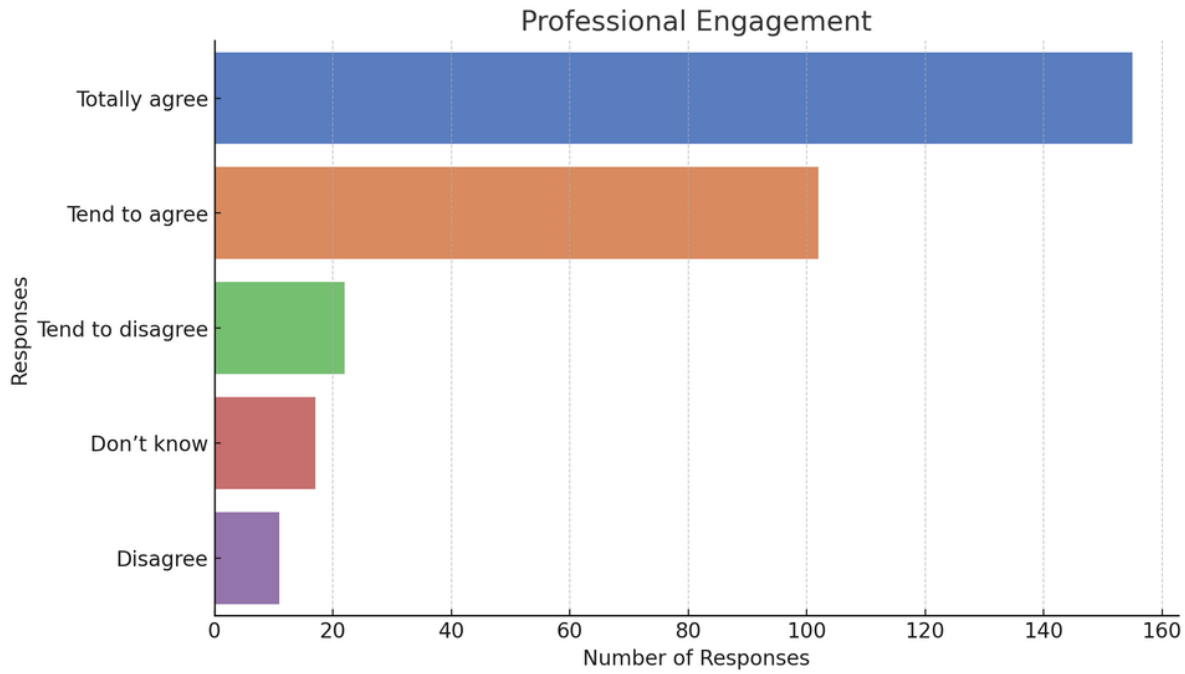
Areas of DIGCOMPEDU AI can be applied

The survey sought participants' opinions on the areas of the DigCompEdu framework where Artificial Intelligence can be utilised. Here is a summary of the responses for each area:

Professional Engagement:

The majority of respondents expressed a strong positive response ("Totally Agree" or "Tend to Agree") towards the use of AI in area of Professional Engagement covered in the survey.

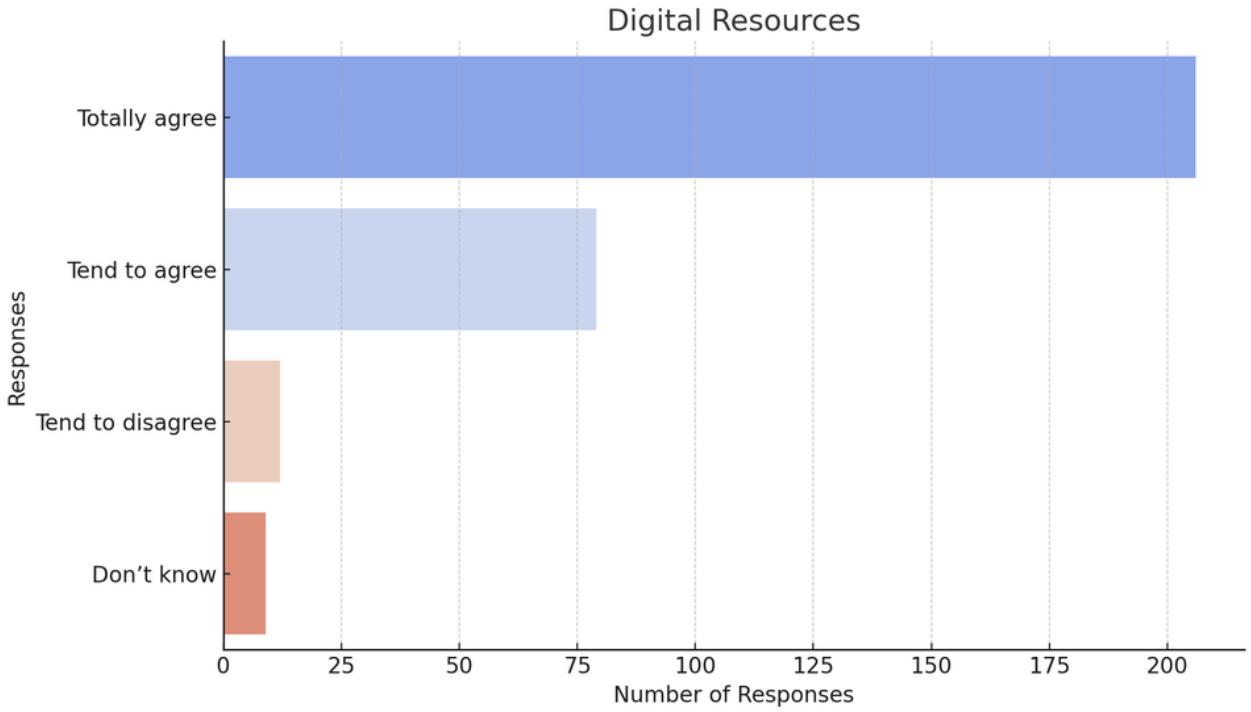
- Totally Agree: 155 responses
- Tend to Agree: 102 responses
- Tend to Disagree: 22 responses
- Don't Know: 17 responses
- Disagree: 11 responses



Digital Resources:

The data indicates a significant positive response, with the majority of respondents either "Totally Agree" or "Tend to Agree" regarding their views towards the use of AI in area of Digital Resources in the context of the survey.

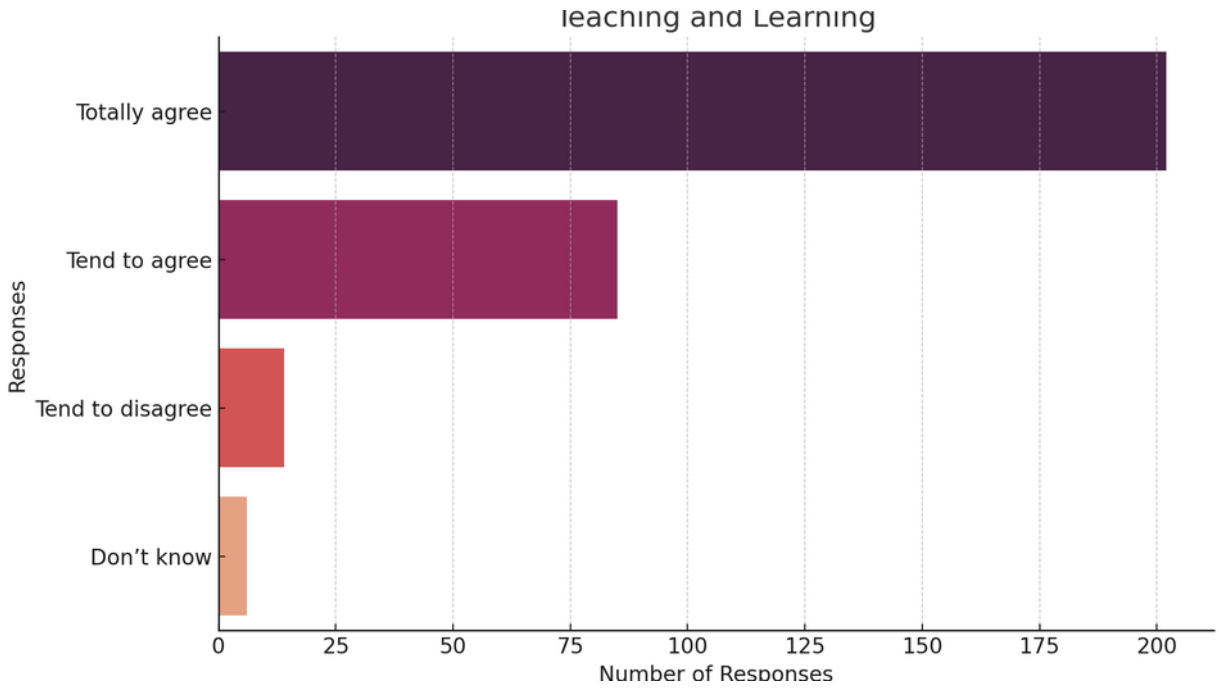
- Totally Agree: 206 responses
- Tend to Agree: 79 responses
- Tend to Disagree: 12 responses
- Don’t Know: 9 responses



Teaching and Learning:

Similar to the previous areas, a significant majority of respondents expressed strong agreement ("Totally Agree" or "Tend to Agree") towards the use of AI in area of Teaching and Learning in the survey context.

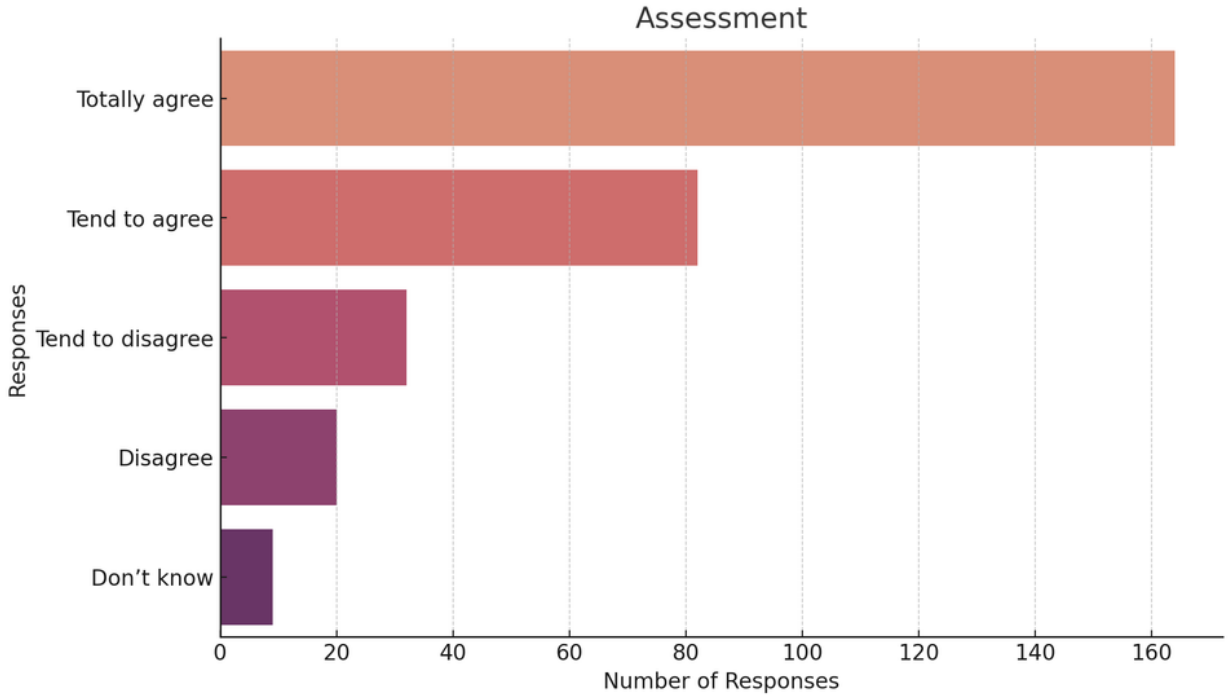
- Totally Agree: 202 responses
- Tend to Agree: 85 responses
- Tend to Disagree: 14 responses
- Don’t Know: 6 responses



Assessment:

Towards the use of AI in area of Assessment while the majority of respondents still express agreement ("Totally Agree" or "Tend to Agree"), there is a notable increase in the number of respondents who "Tend to Disagree" or "Disagree" compared to the previous categories

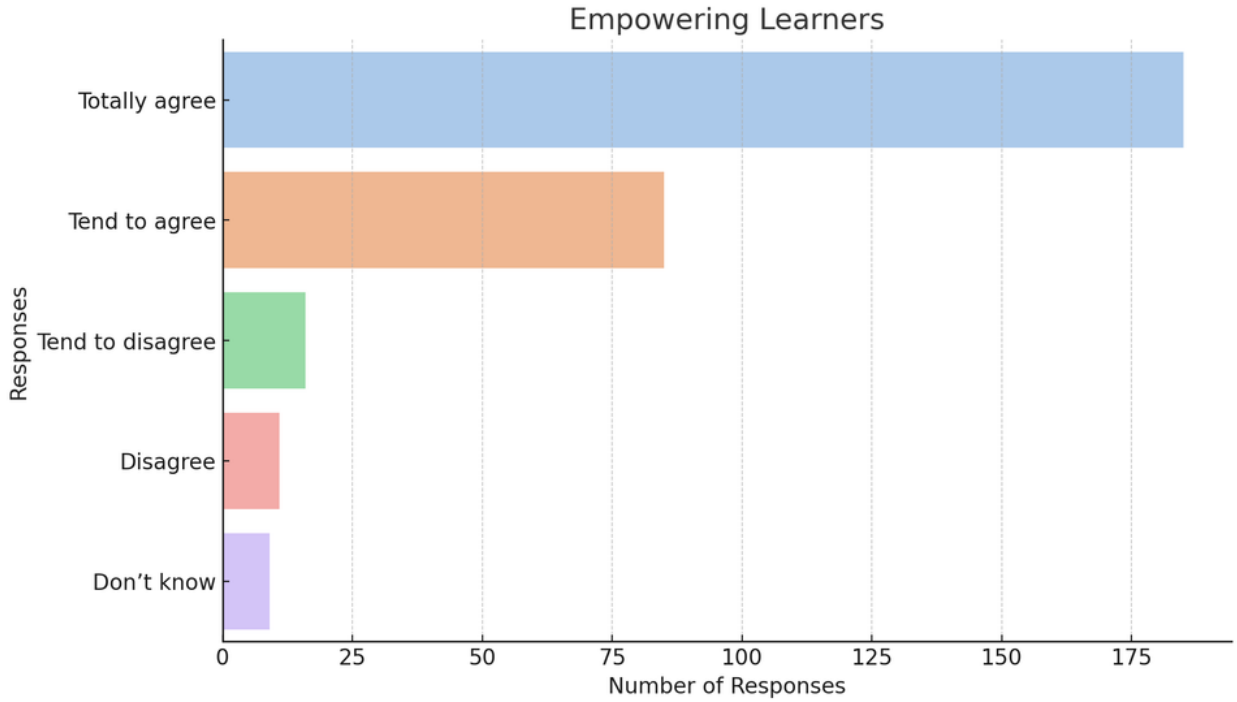
- Totally Agree: 164 responses
- Tend to Agree: 82 responses
- Tend to Disagree: 32 responses
- Disagree: 20 responses
- Don’t Know: 9 responses



Empowering Learners:

A significant majority of the respondents have shown agreement ("Totally Agree" or "Tend to Agree") towards the use of AI in area of Empowering Learners, as indicated in the survey.

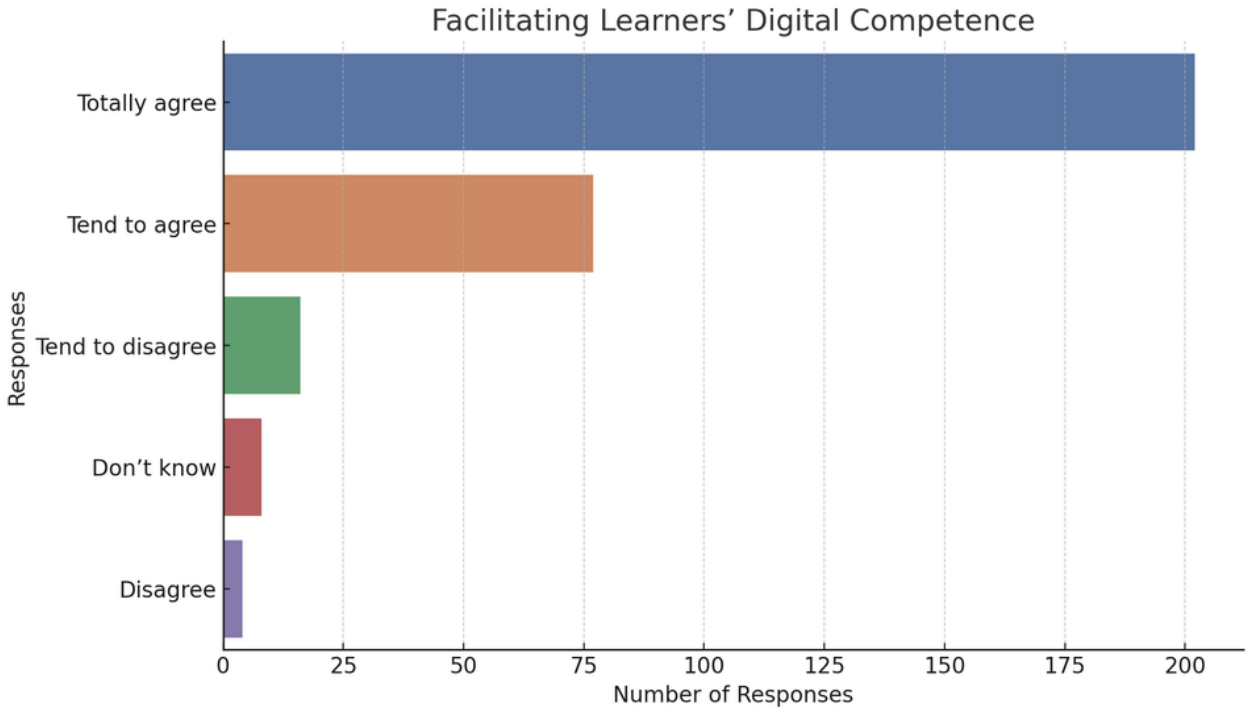
- Totally Agree: 185 responses
- Tend to Agree: 85 responses
- Tend to Disagree: 16 responses
- Disagree: 11 responses
- Don’t Know: 9 responses



Facilitating Learners' Digital Competence:

The data indicates a strong agreement among the majority of respondents, with most indicating they "Totally Agree" or "Tend to Agree" regarding their views towards the use of AI in area of Facilitating learners' digital competence, as mentioned in the survey.

- Totally Agree: 202 responses
- Tend to Agree: 77 responses
- Tend to Disagree: 16 responses
- Don't Know: 8 responses
- Disagree: 4 responses



Across all DIGCOMPEDU areas, there's a consistent trend of strong agreement among the majority of respondents, indicating positive attitudes towards various aspects of competences related to the use of AI in education. This includes professional engagement, the use of digital resources, teaching and learning practices, assessment methods, empowering learners, and facilitating digital competence.

While there are some levels of disagreement or uncertainty in each area, these are significantly outnumbered by the positive responses. This suggests that the majority of educators surveyed recognise and support the integration and importance of AI related competencies in their educational practice.

Interviews with key stakeholders

Interviews were conducted from June to October 2023 with 14 stakeholders from different EU countries, each having diverse backgrounds. The interviewees included experts in AI and learning, among whom one has a notable history in neural networks research and has authored works related to AI philosophy. Others were researchers in educational technologies, and some were advisors and experts in policy development.

Opportunities and advantages of integrating AI into educational settings

The interviews with stakeholders on the use of AI in education reveal various potential opportunities and advantages of integrating AI into educational settings. Here are some of the key points gathered from the interviews:

Enhanced Vocational Training

AI can significantly impact vocational education by updating the content and methods of teaching. AI technologies like generative AI and machine learning can dramatically influence occupational structures, changing what and how people learn. AI tools can process technical handbooks and manuals to answer domain-specific queries, providing up-to-date information and practical guidance in fields like construction and automotive repair.

Personalised Learning Experiences

AI can facilitate individualised learning experiences. For example, AI can act as a private tutor, guiding students through learning content, deciding which material is most relevant based on their previous experiences, and customizing materials to suit individual needs.

Simulation of Real-World Situations

AI can simulate real-world situations, such as workplace scenarios, providing practical training and experience to students without the need for physical presence in such environments.

Educational Process Integration

AI technologies offer immense potential for educational applications, from processing domain-specific information to providing practical, on-demand guidance using multimodal interfaces. This can transform professional knowledge and identity, especially in vocational education

Teacher and Student Role Evolution
The integration of AI in education will evolve the roles of teachers and students. Teachers might increasingly become facilitators or guides, helping students understand the meaning of what they have learned and fostering critical thinking and emotional growth.

Data Analysis and Drafting Support
In vocational and distance learning, AI can be used to analyze data, keep up with new research, and assist in drafting publications, reports, and other educational materials, improving the efficiency and quality of educational administration.

Addressing Educational Challenges
AI can help in solving various educational challenges, including providing insights into student preferences and performance, enabling more effective curriculum design, and offering tools for more engaging and interactive learning experiences.

Ethical and Social Considerations
While integrating AI into education, it's crucial to address ethical and social implications, ensuring fairness, equity, and privacy in AI systems. This includes considering how AI might impact jobs and the importance of transparency in AI-generated content.

These insights indicate that AI has the potential to significantly enhance educational processes, making learning more efficient, personalised, and aligned with the needs of the modern job market. However, careful consideration of ethical and social implications is necessary to ensure that the integration of AI in education is beneficial and equitable

What challenges or concerns they foresee in the adoption and implementation of AI in education

The interviews with stakeholders on the use of AI in education highlight several challenges and concerns regarding the adoption and implementation of AI in educational settings. These include:

Privacy and Data Security
Concerns about the privacy and security of student data are prominent. Ensuring that AI-driven educational environments respect and protect sensitive information is crucial. This includes implementing robust encryption, secure data storage, and strict access controls.

Implementation and Adoption Challenges
There are concerns about whether AI can truly improve the teaching process and whether resources and support systems are adequate for its implementation. The need for educator and institutional readiness, including training and infrastructure, is emphasized.

Ethical and Social Implications
Ethical considerations include algorithmic bias, equitable access, job displacement, and responsible AI deployment. Ensuring fairness and equity in AI systems in education requires diverse and representative data, regular monitoring of biases, and adherence to ethical guidelines.

Teacher and Student Roles
The evolving roles of teachers and students in an AI-integrated educational system present challenges. Teachers need to develop new competencies to understand and use AI effectively, while students require training in digital literacy and ethical AI use.

Cheating and Misuse of AI
There are concerns that AI could make it easier for students to cheat on assignments and impair the process of autonomous learning. Addressing this requires a focus on ethical principles in AI usage and potentially limiting AI tool access to specific needs.

Technological Disparity and Accessibility
The rapid evolution of AI technologies can lead to technological disparities, making it challenging to ensure fairness and equity in educational settings. This highlights the need for ensuring all students, including the most disadvantaged, have access to these technologies.

Trust and Acceptance
Building trust in AI systems among educators and students is essential. This involves understanding the limitations of AI, setting clear guidelines for its use, and ensuring transparency in AI-driven processes.

Assessment and Policy Development
New methods of assessment and policy guidelines are needed to address challenges such as AI-generated misinformation and bias. This includes developing new policies for acknowledging the use of AI in assessments and ensuring the ethical use of AI in education.

To address the challenges and maximise the benefits of AI in education, the stakeholders from the interviews recommend employing several strategies:

Emphasise Data Privacy
Implement robust data protection measures, ensuring student and staff data is handled securely and ethically.

Provide Teacher Trainings
Offer professional development opportunities to educators for them to understand, adopt, and effectively use AI tools in their teaching practices.

Address the Digital Divide
Work towards equitable access to AI tools and resources for all students and teachers, regardless of their socio-economic backgrounds.

Encourage Open Dialogue and Involvement
Involve teachers and administrators in decision-making processes related to AI implementation. This helps ensure that their perspectives and concerns are addressed.

Focus on AI as a Tool to Enhance, Not Replace, Educators
AI should be used to augment teaching, not to replace educators. Educators should focus on tasks that require creativity, emotional intelligence, and personalised support, areas where AI is not as effective.

Develop Specific Regulations and Standards for AI in Education
Create and implement guidelines and standards to ensure the ethical and responsible use of AI in educational settings.

Ensure Transparency of AI Systems
Make AI systems used in education transparent, allowing stakeholders to understand how these systems work and how decisions are made.

Collaborative Effort Among Stakeholders
Encourage a collaborative approach among educators, policymakers, technology developers, and the wider community. This collaboration is crucial for implementing AI in a way that maximises benefits and mitigates risks.

Teacher and Student Roles

The stakeholders envision the role of teachers evolving in the following ways with the integration of AI in education:

Teachers as Tutors and Facilitators: In contexts such as robotics, teachers are expected to remain in a role akin to a tutor, where they attend to students and facilitate their learning. This role involves guiding students through the learning content, providing personalised support, and helping them understand and apply the knowledge they gain from AI-driven resources.

As for the skills and knowledge essential for both teachers and students to effectively interact with AI systems, the following skills and knowledge are typically important:

Digital Literacy
Understanding the basic functions of AI systems and how to interact with them.

Critical Thinking and Evaluation
The ability to critically assess the information provided by AI, including distinguishing between accurate and potentially misleading data.

Data Privacy Awareness
Knowledge of data privacy principles, especially regarding how personal information is used and protected in AI systems.

Ethical Understanding of AI
Awareness of the ethical implications of AI, including issues of bias and fairness.

Problem-Solving and Creativity
Skills in applying AI tools to solve problems creatively and effectively.

Adaptability and Continuous Learning
As AI technology evolves rapidly, the ability to adapt and continuously learn new functionalities and applications of AI systems is crucial.

Effective Communication
Skills in effectively communicating with AI systems (e.g., prompt engineering) and interpreting their outputs.

Implementation and Adoption

When implementing AI technologies in education, educational institutions should consider several key factors to ensure a successful transition and adoption:

Data Privacy
Prioritize the protection of student data, ensuring compliance with data protection laws and ethical standards.

Student Equity
Ensure equitable access to AI technologies for all students, addressing the digital divide and promoting inclusivity.

Teacher Training
Provide comprehensive training for teachers to equip them with the necessary skills and knowledge to effectively use AI in their teaching.

Infrastructure
Develop and maintain the necessary technological infrastructure to support AI applications in educational settings.

Ethical AI Usage
Implement AI solutions that adhere to ethical guidelines, including considerations of fairness, transparency, and accountability.

To ensure a smooth transition and successful adoption of AI in education:

Set Clear Goals
Define specific objectives for the use of AI in education.

Involve Stakeholders
Engage teachers, students, parents, and other key stakeholders in the planning and implementation process.

Provide Infrastructure and Training
Ensure that the necessary technological infrastructure and training are available.

Conduct Pilot Programs
Test AI technologies on a small scale before wider implementation to assess effectiveness and address any issues.

Prioritize Data Privacy
Keep data privacy at the forefront of AI implementation strategies.

Evaluate Outcomes
Regularly assess the impact of AI technologies on educational outcomes.

Maintain Flexibility and Ethical Guidelines
Be adaptable to changes and challenges while adhering to ethical standards in AI usage.

For resources and support systems to facilitate the implementation of AI in education, partnerships with technology companies and access to AI education platforms can be extremely beneficial. These partnerships can provide educational institutions with the necessary tools and support for successful AI implementation, including access to advanced technologies, expertise, and educational resources.

Future Outlook

The stakeholders interviewed shared their perspectives on the future of AI in education and its potential impact in specific areas or applications:

Highly Personalised and Adaptive Learning Experiences
AI holds the potential to offer highly personalised and adaptive learning experiences. This means tailoring education to the unique needs of each student, enabling more effective and individualised learning pathways.

Improved Educational Access and Data-Driven Insights
The use of AI in education can improve access to educational resources and provide data-driven insights. This would enhance student success by enabling educators to make informed decisions based on real-time data about student performance and learning needs.

Automation of Administrative Tasks
AI can significantly impact the automation of administrative tasks in educational settings. This automation will free up educators' time, allowing them to focus more on meaningful interactions with students and on personalized teaching approaches.

Real-Time Feedback on Student Performance
AI technologies can analyse and provide immediate feedback on student performance. This can enhance the effectiveness of assessment and intervention strategies, allowing for timely adjustments in teaching methods and learning activities.

Revolutionising Education
AI has the potential to revolutionise education by making it more personalised, efficient, and accessible. The stakeholders emphasise that responsible and ethical use of AI should be a priority to ensure that it benefits all students and respects their privacy and rights.

Continuous Monitoring, Research, and Collaboration
To fully harness the potential of AI in education, continuous monitoring, research, and collaboration among educators, policymakers, and technology experts are essential. This collaborative approach will ensure that AI is used effectively and responsibly in the educational sector.

INTEGRATION WITH DIGCOMPEDU FRAMEWORK

The DigCompEdu Framework is a comprehensive structure designed to assist educators in developing and enhancing their digital competencies. This framework is particularly relevant in an era where digital devices are ubiquitous and educators are tasked with ensuring students become digitally competent. It's a scientifically sound background framework that aids in guiding policy and can be directly adapted for regional and national tools and training programs. Furthermore, it offers a common language and approach to facilitate the exchange of best practices across different regions and nations.

The framework is structured around 22 elementary competences, organized into six distinct areas:

1. **Professional Engagement**: This area focuses on the use of digital technologies in professional interactions with colleagues, learners, parents, and other stakeholders, as well as for personal professional development and the benefit of the organization.
2. **Digital Resources**: This involves competencies related to the effective and responsible creation, usage, and sharing of digital resources for learning.
3. **Teaching and Learning**: Dedicated to managing and orchestrating the use of digital technologies in teaching and learning processes.
4. **Assessment**: It addresses the incorporation of digital strategies to enhance educational assessment.
5. **Empowering Learners**: Concentrates on the potential of digital technologies for learner-centered teaching and learning strategies.
6. **Facilitating Learners' Digital Competence**: Details specific pedagogic competences required to help students develop their digital competence.

To assist educators in assessing and developing their digital competence, the framework also proposes a progression model. This model outlines six stages of development: Newcomer (A1), Explorer (A2), Integrator (B1), Expert (B2), Leader (C1), and Pioneer (C2). Each stage represents a phase in the development of digital competencies, from assimilating new information and developing basic digital practices to critiquing existing practice and developing new ones.
The DigCompEdu Framework is designed to be universally applicable, providing a general reference for developers of digital competence models, including

Member States, regional governments, educational organisations, and professional training providers. It is directed towards educators across all levels of education, from early childhood to higher and adult education, encompassing general and vocational training, special needs education, and non-formal learning contexts. The framework is adaptable and can be modified to fit specific contexts and purposes

What is the DigCompEdu supplement

The supplement enhances and extends the DigCompEdu framework to include AI-specific competencies serves as a critical addition, recognising the growing influence and importance of artificial intelligence in education. This supplement focuses on integrating AI literacy and competencies into the existing framework, ensuring that educators are not only digitally competent but also proficient in understanding and applying AI technologies in their teaching practices. It includes competencies such as understanding AI concepts, ethical implications, data literacy, and the ability to leverage AI tools for personalised learning, assessment, and enhancing student engagement. This extension also encompass the skills needed to critically evaluate AI resources and to guide students in navigating AI-driven environments safely and responsibly.

Additionally, this AI-specific supplement addresses the need for educators to stay abreast of the rapid advancements in AI technology and its applications in education. It emphasises continuous professional development in AI, encouraging educators to engage in lifelong learning to keep pace with technological advancements. By incorporating these AI-focused competencies, the enhanced DigCompEdu framework empowers educators to harness the potential of AI in enriching the learning experience, fostering innovation, and preparing students for a future where AI is an integral part of their personal and professional lives.

AI competencies alignment with the areas of the DigCompEdu framework

Incorporating AI competencies into the DigCompEdu framework ensures that educators are equipped to handle the challenges and opportunities presented by AI in education, preparing them and their students for a future where AI plays a significant role.

01

Professional Engagement

AI competencies here involve educators' ability to use AI tools for professional development, communication, and collaboration. This includes leveraging AI for personal learning networks, staying updated with AI advancements in education, and using AI-powered communication tools for engagement with peers and stakeholders.

02

Digital Resources

In this area, AI competencies focus on the creation, evaluation, and adaptation of AI-enhanced digital educational resources. Educators need to understand how to use AI tools to develop and customize learning materials, assess the quality of AI-generated content, and responsibly manage and share digital resources.

03

Teaching and Learning

AI competencies here involve integrating AI into teaching strategies and learning activities. Educators should be adept at using AI to support personalized learning experiences, employing AI tools for interactive and engaging instruction, and understanding how AI can aid in diverse educational settings.

04

Assessment

AI competencies in assessment include utilizing AI tools for efficient and effective student evaluation. This can involve automated grading systems, AI-driven analytics for assessing student progress, and using AI to provide personalized feedback and support.

05

Empowering Learners

AI competencies relate to using AI to cater to diverse learning needs and styles, promoting inclusivity and accessibility. Educators should be capable of leveraging AI to support special educational needs, facilitate self-regulated learning, and encourage critical thinking about AI and its impact.

06

Facilitating Learners' Digital Competence

AI competencies are crucial for educators to help students develop their digital competence. This includes teaching students about AI concepts, ethical AI usage, data literacy, and the role of AI in society. Educators should also guide students in critically assessing AI-generated information and understanding AI's limitations and biases.

Progression model in the supplement

We are using the same progression model in the supplement for AI competencies as the one in the DigCompEdu framework. By using the same progression model, the AI supplement to the DigCompEdu framework becomes an integral part of the existing digital competence development strategy, facilitating a comprehensive approach to educator upskilling in the digital age.

Maintaining the same progression model ensures consistency across the framework. Educators who are already familiar with the DigCompEdu framework can easily understand and adapt to the AI supplement, as it follows a familiar structure.

The consistent progression model simplifies the process of professional development for educators. They can track their growth and development in AI competencies in a manner that is aligned with their overall digital competence development. Using the same model makes it easier to integrate AI competencies into existing training programs, curricula, and professional development initiatives. This integration is essential for a holistic approach to educator competence development.

A uniform progression model across different areas of digital competence, including AI, provides clarity and coherence. Educators can clearly see how their skills in AI relate to and complement other digital competencies. The progression model allows educators to set clear goals for their learning and professional growth. They can self-assess their current stage in AI competencies and plan their development pathway accordingly. A consistent model across the framework allows for benchmarking and standardization in educator training and development. Educational institutions can uniformly assess and support the AI competency development of their staff.

When educators are on a common progression scale, it fosters an environment of collaboration and peer learning. Educators at similar or different stages can effectively share experiences, strategies, and insights. The progression model, known for its adaptability and flexibility, allows educators to develop at their own pace while ensuring they cover all necessary aspects of AI competencies.

Professional Engagement

Artificial Intelligence (AI) can significantly transform the domain of Professional Engagement for educators, offering novel ways to enhance their professional development, communication, and collaboration. Firstly, AI can serve as a powerful tool for personalized professional learning. Educators can leverage AI-driven platforms that offer customized learning experiences, tailoring content to their specific needs, interests, and skill levels. These platforms can analyze educators' learning patterns and progress, recommending resources and courses that fill gaps in their knowledge or skills. Furthermore, AI can facilitate more effective communication and collaboration among educators. AI-powered communication tools, such as intelligent chatbots and automated response systems, can streamline administrative tasks and enable educators to focus more on meaningful interactions with colleagues and students. AI can also foster collaborative networks by connecting educators with peers or experts worldwide, based on shared interests or educational challenges, facilitating the exchange of ideas, best practices, and innovative teaching strategies.

AI in Professional Engagement extends to enhancing organizational efficiency and decision-making in educational settings. AI systems can analyze large sets of educational data, providing insights into trends, student performance, and resource utilization. This data-driven approach enables educators and administrators to make more informed decisions regarding curriculum design, resource allocation, and educational strategies. Additionally, AI's role in ethical and responsible professional practices cannot be understated. Educators can use AI to stay informed about the latest developments in educational technology, including ethical considerations surrounding data privacy, bias in AI algorithms, and equitable technology use. By incorporating AI into various facets of Professional Engagement, educators not only streamline their workflow and enhance their professional growth but also contribute to building a more informed, efficient, and ethically aware educational environment.

Professional Engagement

Activities

Participate in AI-focused PD Programs:

Attend workshops, webinars, or online courses on AI in education.
Engage in self-paced learning through AI-focused educational platforms.

Collaborate Using AI Tools:

Use AI-powered communication platforms for team projects and discussions.
Participate in online forums or networks focused on AI in education.

Experiment with AI for Organizational Tasks:

Implement AI tools for scheduling, email management, or data analysis within your team or institution.
Evaluate the impact of these tools on efficiency and share findings with colleagues.

Develop and Share AI Resources:

Create and disseminate resources or guides on using AI tools for professional development.
Share experiences and best practices in AI integration within professional networks.

Organize or Participate in AI Ethics Discussions:

Organize discussions or study groups on ethical AI use in education.
Participate in workshops or seminars focusing on the ethical implications of AI.

AI in Professional Learning Communities:

Engage in professional learning communities where AI in education is a key focus.
Collaborate on projects exploring innovative uses of AI in educational settings.

Contribute to AI Policy Development:

Participate in institutional policy-making processes regarding the use of AI tools.
Advocate for responsible and ethical AI use in professional settings.

Progression	Proficiency statements
Newcomer (A1)	• **Understands the basics** of how AI can be used for professional development and communication. • **Begins to engage** with AI tools for simple tasks like automated email responses or basic data analysis for classroom management. • **Awareness of the potential** of AI in professional networking and development but limited practical application.
Explorer (A2)	• **Actively explores** different AI tools for professional communication and development. • **Starts to integrate** AI into routine professional tasks, such as using AI for organizing meetings or basic data interpretation. • **Participates** in professional learning communities discussing AI in education, sharing initial experiences and learning from peers.
Integrator (B1)	• **Regularly uses** AI tools for a range of professional activities, including advanced data analysis and communication optimization. • **Integrates AI** into professional development plans, seeking out AI-focused training and resources. • **Collaborates** using AI tools, demonstrating effective use in team projects or collaborative initiatives.
Expert (B2)	• **Expertly navigates** a variety of AI tools for advanced professional purposes, such as predictive analytics for student performance. • **Leads professional development sessions** or workshops on AI for colleagues, sharing expertise and best practices. • **Innovatively uses AI** for personal and organisational growth, contributing to the wider educational community through AI-enhanced initiatives.

Progression	Proficiency statements
Leader (C1)	• **Leads the adoption** of cutting-edge AI technologies in professional settings. • **Shapes organizational policies** and practices around the use of AI in professional engagement. • **Mentors others** in the integration of AI into professional practices, driving change and innovation within the educational community.
Pioneer (C2)	• **Advances the field** by contributing original ideas or research on the use of AI in professional development and communication. • **Leads major projects** or initiatives that transform professional engagement through AI at a systemic level. • **Recognized expert and thought leader** in the use of AI in educational settings, influencing policy, practice, and future developments.

The integration of Artificial Intelligence (AI) in the Professional Engagement of educators, while offering numerous benefits, also presents several challenges:

Challenges

Lack of Training and Technical Expertise:

- Educators may lack the necessary training and technical expertise to effectively use AI tools. This gap can hinder the optimal use of AI in professional development, communication, and collaboration.
- There is often a need for substantial professional development to ensure educators are comfortable and proficient in utilizing AI technologies.

Data Privacy and Security Concerns:

- Utilizing AI tools often involves handling sensitive data, raising concerns about privacy and security. Educators must navigate these issues while ensuring compliance with data protection regulations.
- The risk of data breaches or misuse of personal and professional information can be a significant concern.

Ethical Considerations:

- AI in education brings forth ethical considerations, such as algorithmic bias and the equitable use of technology. Educators must be aware of these issues and strive to use AI ethically and responsibly.
- There is also the challenge of ensuring that AI tools do not perpetuate existing biases or create new forms of inequality.

Reliability and Accuracy:

- The reliability and accuracy of AI tools can be a concern, especially when these tools are used for critical tasks like professional evaluations or communication.
- Educators must critically assess the outputs of AI systems and not rely on them blindly.

Resistance to Change and Technological Integration:

- Resistance to change is a common challenge, as some educators may be hesitant to integrate AI into their professional practices due to discomfort with new technology or fear of redundancy.
- This resistance can be exacerbated by a lack of understanding of the benefits and functionalities of AI.

Resource Availability and Digital Divide:

- Access to AI tools and resources can be uneven, contributing to a digital divide. Not all educators may have equal access to the necessary technology, training, or support.
- The cost of implementing AI tools can also be a barrier for some institutions, particularly in under-resourced educational settings.

Maintaining Human Connection:

- Over-reliance on AI for professional engagement could potentially diminish the human connection and interpersonal skills that are crucial in education.
- Balancing the use of AI with the need for personal interaction and relationship-building is a nuanced challenge.

Digital Resources

Artificial Intelligence (AI) has a profound impact on the creation, utilization, and management of digital resources in education, revolutionizing how educational content is developed and accessed. AI technologies enable educators to create highly adaptive and personalized learning materials that cater to the diverse needs of students. For instance, AI algorithms can analyze individual learning patterns and preferences, allowing educators to design resources that adapt in real-time, providing a tailored learning experience for each student. This personalization extends to adaptive textbooks, interactive learning modules, and AI-driven simulations, which respond dynamically to students' interactions and progress. Moreover, AI can assist educators in efficiently curating and organizing vast amounts of educational content. Using AI-powered search and recommendation systems, educators can quickly locate the most relevant and effective resources from extensive digital libraries, significantly reducing the time and effort required in resource preparation.

In addition to resource creation and curation, AI plays a crucial role in evaluating and enhancing the quality of digital resources. Through advanced analytics, AI tools can provide insights into how students interact with digital materials, offering feedback on the effectiveness of these resources in real-time. This data-driven approach enables continuous improvement of educational content, ensuring it remains engaging and pedagogically sound. AI also aids in ensuring the responsible use and distribution of digital resources. It can automate the detection of copyright issues, manage digital rights, and ensure that resources comply with privacy regulations, thus maintaining ethical standards in the digital learning environment. By leveraging AI in the management and enhancement of digital resources, educators are not only able to provide more engaging and effective learning experiences but also contribute to the responsible and ethical dissemination of educational content.

Digital Resources

Activities

Develop AI-Enhanced Learning Materials:

Use AI tools to create interactive and personalized learning materials, such as adaptive quizzes or AI-generated educational content.

Modify existing resources with AI elements to increase engagement and personalization.

Participate in AI Resource Evaluation:

Critically assess the quality and suitability of AI-enhanced digital resources available for education.

Share reviews and recommendations with the educational community.

Organize Workshops on AI Resources:

Conduct or participate in workshops focusing on creating and using AI-enhanced digital resources.

Collaborate with colleagues to explore different AI tools and their applications in resource development.

Stay Informed about AI Resource Trends:

Follow educational technology blogs, newsletters, and forums that focus on AI in digital resource creation.

Attend webinars and conferences on the latest AI tools and trends in educational resources.

Implement Responsible Resource Management:

Develop and apply strategies for the ethical use and sharing of AI-generated resources.

Educate others about the importance of copyright and data privacy in AI-enhanced digital materials.

Collaborative AI Resource Creation:

Engage in collaborative projects to create AI-enhanced digital resources, pooling expertise and resources with other educators.

Share and discuss the created resources in professional learning communities.

Explore AI for Diverse Learning Needs:

Experiment with AI tools to create resources for learners with diverse needs, including special education or language learners.

Assess the effectiveness of these resources in meeting the varied needs of learners.

Progression	Proficiency statements
Newcomer (A1)	• **Awareness:** Understands the basic concept of AI and its potential to enhance digital resources. • **Exploration:** Begins to explore AI tools for creating simple digital content, such as using AI-assisted design software for basic tasks. • **Familiarity:** Gains basic familiarity with AI-enhanced resources available for education, though actual usage might be limited.
Explorer (A2)	• **Experimentation:** Actively experiments with AI tools for resource creation, like utilizing text generators or simple data analysis tools for educational content. • **Selection:** Starts to identify and select AI-enhanced digital resources that align with learning objectives. • **Integration:** Integrates basic AI-generated content into teaching materials, understanding the benefits and limitations.
Integrator (B1)	• **Proficient Use:** Regularly utilizes AI tools for developing and modifying digital resources, such as using advanced data analytics for resource customization. • **Critical Evaluation:** Critically evaluates AI-enhanced resources for educational quality and relevance. • **Sharing Practices:** Begins to share insights and AI-enhanced resources with colleagues, contributing to the school's digital resource pool.
Expert (B2)	• **Advanced Creation:** Expertly creates sophisticated AI-enhanced digital resources, tailoring them to complex educational needs. • **Leadership in Resource Development:** Leads initiatives in the development and evaluation of AI-enhanced digital resources. • **Mentoring:** Guides and trains other educators in the effective use and creation of AI-enhanced digital resources.

Progression	Proficiency statements
Leader (C1)	• **Innovative Practices:** Innovates in the use of AI for digital resource creation, setting standards in resource quality and relevance. • **Strategic Implementation:** Plays a key role in strategic planning and implementation of AI in resource development at an institutional level. • **Community Contribution:** Actively contributes to professional communities by sharing advanced practices and resources in AI-enhanced digital content.
Pioneer (C2)	• **Pioneering Development:** Contributes original ideas or research in the field of AI-enhanced digital resources. • **Systemic Transformation:** Leads transformative projects that redefine how AI is used in creating and managing digital resources in educational settings. • **Thought Leadership:** Recognized as a thought leader in AI and digital resources, influencing policy, practice, and future development in educational technology.

The integration of Artificial Intelligence (AI) in creating and managing digital resources presents several challenges that need to be addressed for its effective use in educational settings

Challenges

Quality and Relevance of AI-Generated Content:

- AI-generated content might not always align with the specific educational goals or curriculum standards. Ensuring the relevance and quality of AI-created materials can be challenging.
- The accuracy and pedagogical soundness of AI-generated content need constant monitoring and evaluation.

Technical Limitations and Reliability:

- AI tools can have technical limitations and may not always understand the context or nuances of educational content. Reliability in generating and curating content can be a concern.
- Educators must often verify and adjust AI-generated resources to ensure they meet educational standards.

Data Privacy and Security Concerns:

- AI systems often require access to large datasets, which might include sensitive information. Ensuring the privacy and security of this data is a significant challenge.
- There are risks associated with data breaches or unauthorized access to educational materials.

Ethical Considerations and Bias:

- AI algorithms can inadvertently perpetuate biases present in their training data. This can lead to biased or skewed educational materials.
- Ensuring that digital resources are inclusive and free from bias is a critical challenge.

Cost and Resource Constraints:

- Developing or accessing AI tools for digital resource creation can be costly. Budget constraints may limit the availability of these advanced technologies, particularly in under-resourced educational settings.
- Continuous updates and maintenance of AI systems also require financial and human resources.

Digital Divide and Accessibility:

- The digital divide can exacerbate inequalities, where not all students or educators have equal access to AI-enhanced digital resources.
- Ensuring that AI-generated resources are accessible to all learners, including those with disabilities, is a significant challenge.

Teacher Preparedness and Training:

- Educators may require additional training to effectively use and evaluate AI-generated resources. Lack of preparedness can hinder the optimal use of AI in education.
- Continuous professional development is needed to keep educators updated with evolving AI technologies.

Overreliance on Technology:

- There is a risk of becoming overly reliant on AI for content creation and curation, potentially diminishing the role of creative and critical input from educators.
- Balancing AI use with human judgment and expertise is essential for effective educational outcomes.

Teaching and Learning

The integration of Artificial Intelligence (AI) in Teaching and Learning heralds a transformative shift in educational methodologies, enabling more personalised, efficient, and engaging learning experiences. In the classroom, AI can be leveraged to develop adaptive learning systems that customise educational content to meet the unique needs of each student. These systems analyse learning patterns and performance, adjusting the difficulty level and suggesting resources tailored to individual learning needs and pace. This personalisation ensures that learners receive support and challenges precisely suited to their requirements, leading to more effective and meaningful learning experiences. Furthermore, AI-driven tools like intelligent tutoring systems can provide individualised support and feedback to students, filling gaps that might exist in traditional classroom settings. These tools act as virtual tutors, offering explanations, guiding problem-solving, and providing practice exercises, thereby enhancing understanding and retention of subject matter.

AI significantly aids in making learning more interactive and engaging. With technologies like natural language processing and machine learning, AI can facilitate immersive learning experiences through conversational interfaces, educational games, and simulations. These interactive platforms stimulate students' curiosity and involvement, making learning more enjoyable and effective. AI also plays a critical role in augmenting teachers' capabilities. It can assist educators in creating dynamic lesson plans, providing insights into students' learning progress, and identifying areas where interventions might be needed. Teachers can thus focus more on the pedagogical aspects of teaching, such as facilitating discussions, mentoring, and nurturing critical thinking skills, while AI handles the analytical and administrative tasks. By integrating AI into Teaching and Learning, educators can create a more inclusive, adaptive, and engaging educational environment, preparing students effectively for the challenges of the future.

Teaching and Learning

Activities

Design AI-Integrated Lesson Plans:

- Develop and implement lesson plans that incorporate AI tools, such as using AI-driven simulations or adaptive learning platforms.
- Experiment with different AI applications to enhance teaching in various subject areas.

Conduct AI Literacy Workshops:

- Organize workshops or classroom sessions focused on AI literacy, covering topics like AI functionality, ethical use, and its societal impact.
- Encourage student discussions and critical thinking about AI and its role in society.

Implement AI-Based Personalized Learning:

- Use AI tools to analyze student performance and tailor learning experiences to individual needs.
- Provide students with AI-powered personalized learning resources, like adaptive quizzes or interactive learning modules.

Foster AI-Enhanced Collaborative Projects:

- Facilitate group projects where students use AI tools for research, data analysis, or creative tasks.
- Encourage peer-to-peer learning and collaboration through AI-enhanced activities.

Stay Updated with AI Educational Trends:

- Regularly attend professional development sessions, webinars, or conferences on AI in education.
- Stay informed about the latest AI tools and methodologies in education and consider how they can be integrated into teaching.

Utilize AI for Classroom Management:

- Implement AI tools for classroom management tasks, like tracking attendance, student participation, and engagement analytics.
- Assess the impact of these tools on classroom efficiency and student engagement.

Encourage Ethical Discussions on AI:

- Initiate classroom discussions on the ethical aspects of AI, including privacy, bias, and decision-making.
- Incorporate case studies or current events related to AI into lessons to spur critical thinking.

Progression	Proficiency statements
Newcomer (A1)	• **Basic Awareness:** Understands the fundamental concepts of AI and its potential impact on teaching and learning. • **Initial Application:** Begins to use simple AI tools, such as AI-powered educational games or basic analytics, to support teaching. • **Learning and Observation:** Actively learns about AI in education through observation, research, and participation in basic training sessions.
Explorer (A2)	• **Experimentation:** Explores various AI tools and resources for teaching, such as adaptive learning platforms and AI-assisted content creation tools. • **Integration into Teaching:** Starts integrating AI into lesson plans and teaching activities in limited or trial capacities. • **Reflection:** Reflects on the effectiveness and challenges of using AI in teaching, seeking feedback and making adjustments.
Integrator (B1)	• **Proficient Use:** Regularly integrates AI tools into teaching practices, using AI to enhance lesson delivery, student engagement, and learning outcomes. • **Collaboration:** Collaborates with peers to share experiences and strategies for integrating AI into teaching. • **Adaptive Learning Strategies:** Implements AI-driven adaptive learning strategies to cater to diverse student needs.
Expert (B2)	• **Advanced Implementation:** Expertly uses a range of AI tools for sophisticated teaching strategies, such as personalized learning paths and predictive analytics. • **Innovation in Pedagogy:** Innovates in the development of AI-enhanced teaching methodologies. • **Professional Development Leader:** Leads professional development workshops or training sessions on AI in education for other educators.

Progression	Proficiency statements
Leader (C1)	• **Strategic Planning:** Plays a strategic role in planning and implementing AI integration across curricula and educational programs. • **Mentorship and Guidance:** Acts as a mentor and advisor for colleagues in the effective use of AI in teaching. • **Educational Transformation:** Leads initiatives and projects that transform teaching and learning practices through the integration of AI at an institutional or wider level.
Pioneer (C2)	• **Pioneering Innovations:** Contributes original research or innovative practices in the use of AI in teaching and learning. • **Systemic Impact:** Influences systemic changes in educational practices and policies regarding the use of AI in teaching and learning. • **Thought Leadership:** Recognized as a thought leader in AI in education, influencing educational practices and frameworks at national or international levels.

Integrating Artificial Intelligence (AI) in Teaching and Learning brings significant advantages but also poses several challenges that need to be addressed

Challenges

Adaptation to Diverse Learning Environments:

- Tailoring AI applications to effectively address the diverse needs of students can be challenging. AI systems may not always accurately adapt to individual learner differences, especially in complex learning scenarios.
- Balancing AI-driven instruction with traditional teaching methods to cater to varied learning preferences is a nuanced task.

Quality and Relevance of AI-Driven Content:

- Ensuring that AI-generated or AI-curated educational content is accurate, relevant, and aligns with curriculum standards is a significant challenge. There's a risk of AI tools providing oversimplified or contextually inappropriate content.
- Continuous monitoring and updating of AI systems are required to maintain the quality and relevance of educational content.

Teacher Preparedness and Training:

- Educators may lack sufficient training and expertise to integrate AI tools into their teaching effectively. This gap can hinder the potential of AI to enhance learning experiences.
- Professional development programs are needed to equip teachers with the necessary skills to use AI in teaching.

Data Privacy and Ethical Concerns:

- AI systems in education often involve processing sensitive student data, raising concerns about privacy and data security.
- Ethical considerations, such as algorithmic transparency and fairness, are crucial, especially in assessments and personalised learning recommendations.

Technical Infrastructure and Accessibility:

- Adequate technical infrastructure is required to support AI tools in education. In many cases, schools lack the necessary hardware, software, or internet connectivity.
- The digital divide may exacerbate inequalities, with students in under-resourced areas having limited access to AI-enhanced education.

Dependency and Reduced Human Interaction:

- Over-reliance on AI for teaching and learning can lead to a decrease in direct human interaction, which is vital for developing social skills and critical thinking.
- Balancing the use of AI with the need for human mentorship and interaction is essential.

Evaluation and Continuous Improvement:

- Regularly evaluating the effectiveness of AI tools in improving learning outcomes can be challenging. It requires robust mechanisms to assess and refine AI applications continually.
- Adapting AI tools based on feedback and educational outcomes requires ongoing effort and resources.

Integrating AI with Existing Educational Practices:

- Seamlessly integrating AI tools into existing educational frameworks and practices can be complex. It requires careful planning and consideration of how these tools complement traditional teaching methods.
- Change management strategies are often needed to successfully implement AI in teaching and learning environments.

Assessment

In the realm of Assessment, Artificial Intelligence (AI) presents groundbreaking opportunities to enhance the accuracy, efficiency, and effectiveness of evaluating student learning. AI-driven assessment tools can automate the grading process for a range of assignments, from simple quizzes to more complex written responses. This automation not only saves valuable time for educators but also ensures consistent and unbiased grading. For instance, AI algorithms can be trained to understand and evaluate the quality of students' written work, providing immediate and personalised feedback. This rapid feedback mechanism allows students to understand their areas of improvement in real-time, fostering a more dynamic and responsive learning process. Furthermore, AI's capability to analyse vast sets of assessment data can offer deeper insights into student performance and learning trends. By identifying patterns and anomalies in students' responses, AI tools can help educators pinpoint specific areas where learners struggle, allowing for timely and targeted interventions.

Beyond efficiency, AI transforms assessment into a more adaptive and formative process. Adaptive testing, powered by AI, adjusts the difficulty of questions based on the student's performance in real-time, ensuring that the assessment aligns with the individual learner's ability and knowledge level. This adaptability makes assessments more personalised and less stressful for students, as they are continuously evaluated at an appropriate challenge level. AI also opens avenues for innovative assessment methods, such as game-based assessments and simulations, where students' decision-making, problem-solving skills, and knowledge application can be evaluated in interactive and engaging ways. In the bigger picture, the integration of AI in assessment practices contributes to a more nuanced understanding of educational effectiveness. It allows for the continuous refinement of teaching methodologies based on comprehensive, data-driven insights, leading to an overall enhancement of the educational experience.

Assessment

Activities

Implement AI-Powered Grading Tools:

- Use AI-based tools for grading objective assessments, like quizzes and tests, to increase efficiency and reduce workload.
- Evaluate the accuracy and reliability of automated grading systems and adjust them as needed.

Analyze Student Performance with AI Analytics:

- Employ AI-driven data analytics tools to analyze student performance patterns and learning progress.
- Use insights from analytics to adjust teaching methods and provide targeted support to students.

Conduct Workshops on Ethical AI Assessment:

- Organize or participate in workshops focusing on ethical practices in AI-assisted assessment, covering topics like fairness and data privacy.
- Encourage discussions on the implications of AI in assessment among colleagues and students.

Design AI-Enhanced Assessment Activities:

- Develop and implement innovative assessment activities that utilize AI, such as adaptive quizzes or project-based assessments with AI elements.
- Experiment with AI tools that assess students' critical thinking, creativity, and problem-solving skills.

Stay Informed about AI Assessment Trends:

- Regularly attend professional development sessions and webinars on the latest AI tools and trends in educational assessment.
- Stay up-to-date with research and publications on AI in assessment to continuously refine assessment practices.

Promote Academic Integrity in AI-Assisted Assessments:

- Educate students about academic integrity in the context of AI-assisted assessments.
- Implement strategies to ensure fairness and integrity in assessments, such as using AI tools that detect plagiarism.

Share Best Practices in AI Assessment:

- Collaborate with peers to share experiences, challenges, and best practices in using AI for assessment.
- Participate in professional learning communities or forums focused on AI in education.

Progression	Proficiency statements
Newcomer (A1)	• **Basic Understanding:** Recognizes the potential of AI in enhancing assessment practices, such as automated grading or feedback. • **Initial Use:** Begins to experiment with basic AI tools for assessment, like using simple quiz platforms with automated scoring. • **Awareness:** Gains awareness of the benefits and limitations of AI in assessment, understanding the need for human oversight.
Explorer (A2)	• **Exploratory Integration:** Actively explores different AI assessment tools, integrating them into some assessments to enhance efficiency. • **Data Interpretation:** Starts to interpret and utilize data generated by AI assessment tools for understanding student performance. • **Feedback and Adjustments:** Provides feedback on AI-assisted assessments and makes adjustments based on student responses and outcomes.
Integrator (B1)	• **Regular Application:** Regularly uses AI tools for a variety of assessment tasks, enhancing the assessment process's efficiency and effectiveness. • **Data-Driven Decisions:** Utilizes AI-generated data to inform teaching strategies and identify areas for student improvement. • **Collaborative Sharing:** Shares experiences and strategies with peers for integrating AI in assessment, contributing to professional learning communities.
Expert (B2)	• **Advanced Techniques:** Expertly employs advanced AI assessment tools, such as predictive analytics and adaptive testing, to tailor assessments to individual learner needs. • **Innovative Assessment Design:** Designs innovative assessment strategies that leverage AI capabilities, improving accuracy and insights into student learning. • **Professional Development Contributor:** Leads training and professional development sessions on AI in assessment, sharing expertise with other educators.

Progression	Proficiency statements
Leader (C1)	• **Strategic Implementation:** Strategically implements AI in assessment practices at an organizational or departmental level, influencing broader assessment policies. • **Mentorship and Guidance:** Mentors colleagues in the effective use of AI in assessment, providing guidance and support. • **Systemic Improvement:** Initiates and leads projects that significantly improve assessment practices through AI integration, impacting educational standards and practices.
Pioneer (C2)	• **Pioneering Research:** Contributes original research or innovative practices in the field of AI-enhanced assessment, advancing the field. • **Influencing Policy and Practice:** Influences policy and practice at a systemic level, driving changes in how AI is integrated into assessment in educational settings. • **Thought Leadership:** Recognized as a thought leader in AI in assessment, shaping the future direction of educational assessment practices and frameworks at a national or international level.

Integrating Artificial Intelligence (AI) into the assessment process in education brings a set of challenges that need careful consideration

Challenges

Accuracy and Reliability of AI Assessments:

- Ensuring the accuracy and reliability of AI in assessments is a significant challenge. AI algorithms might not always correctly interpret open-ended responses or complex student inputs, leading to inaccuracies.
- Constant validation and refinement of AI algorithms are required to maintain assessment integrity.

Bias and Fairness:

- AI systems can inadvertently embed biases present in their training data, which can lead to unfair assessments for certain groups of students.
- It's crucial to regularly audit and update AI tools to minimize biases and ensure fairness in assessments.

Ethical and Privacy Concerns:

- The use of AI in assessments raises ethical concerns, particularly around data privacy and the use of student data. Maintaining the confidentiality and security of student information is paramount.
- There is also the need for transparency in how AI systems make decisions and provide grades or feedback.

Teacher and Student Acceptance:

- Gaining acceptance from both teachers and students for AI-driven assessments can be challenging. There might be skepticism about the effectiveness and fairness of AI in grading.
- Educating stakeholders about the benefits and limitations of AI in assessment is necessary to build trust and acceptance.

Integration with Traditional Assessment Methods:

- Integrating AI into existing assessment frameworks without disrupting traditional methods requires careful planning and execution.
- Balancing AI-driven assessments with conventional assessment practices is essential to cater to diverse educational needs and contexts.

Technical Infrastructure and Resources:

- Implementing AI-based assessment tools often requires significant technical infrastructure, including hardware, software, and robust internet connectivity, which may not be available in all educational settings.
- The cost associated with these technologies can be prohibitive for some institutions, especially those with limited budgets.

- **Professional Development for Educators:**
  - Educators need adequate training to understand, interpret, and effectively use AI-driven assessment data.
  - Continuous professional development is required to keep educators updated with evolving AI assessment technologies.

- **Dependence on Technology:**
  - Over-reliance on AI for assessment can lead to a reduction in human judgment in evaluating student performance.
  - Ensuring a balanced approach where AI supplements rather than replaces human evaluators is crucial.

Empowering Learners

The use of Artificial Intelligence (AI) in empowering learners marks a significant advancement in educational practices, offering personalised and inclusive learning experiences. AI has the unique capability to tailor educational content to the individual needs and abilities of each student, thereby facilitating a more personalised learning journey. This personalisation is achieved through AI-driven adaptive learning systems, which analyse students' interactions, performance, and preferences to deliver customised content and learning pathways. Such systems can dynamically adjust the difficulty of tasks, provide additional resources for challenging topics, or accelerate learning when a student shows proficiency. This approach not only caters to the diverse learning needs of a classroom but also ensures that every student receives the attention and resources they need to succeed. Furthermore, AI can significantly contribute to inclusive education. For learners with special educational needs, AI-powered tools like speech recognition, language translation, and interactive learning aids can offer invaluable support, making learning more accessible and engaging. These tools can help break down barriers for students with disabilities, ensuring that education is equitable and accessible to all.

AI empowers learners by fostering independence and critical thinking. With AI resources, students can take more control over their learning process, exploring subjects at their own pace and according to their interests. AI systems can also encourage learners to engage in critical thinking and problem-solving. By presenting them with real-world scenarios and interactive problem-solving tasks, AI tools can sharpen students' analytical and decision-making skills. Moreover, the integration of AI in education prepares students for a future increasingly shaped by technology. By interacting with AI tools and learning about their functionalities and applications, students gain essential digital literacy skills and an understanding of AI's impact on various aspects of life and work. This knowledge equips them with the competencies needed to navigate and succeed in a technology-driven world. In essence, AI's role in empowering learners lies not only in enhancing the learning experience but also in equipping them with the skills and confidence to succeed in a rapidly evolving digital landscape.

Empowering Learners

Activities

Implement AI-Driven Adaptive Learning:

- Integrate AI-based adaptive learning platforms that adjust content and difficulty based on individual learner performance.
- Monitor and adjust these platforms to best fit the learning needs of each student.

Develop Inclusive AI Learning Tools:

- Employ AI tools that offer personalized learning experiences to students with diverse abilities, including text-to-speech, language translation, and visual aids.
- Collaborate with special education specialists to ensure AI tools effectively support learners with special needs.

Guide Learners in AI Projects:

- Facilitate projects where learners use AI tools to research, create, or solve problems, promoting hands-on experience with AI.
- Provide guidance on using AI responsibly and creatively in these projects.

Organise AI Literacy Workshops:

- Conduct workshops or classroom sessions to teach learners about AI, covering how it works, its applications, and its impact on society.
- Encourage discussions and critical thinking about the role and influence of AI.

Promote Ethical Use of AI:

- Integrate discussions on ethics in AI, covering topics like data privacy, algorithm bias, and digital citizenship.
- Encourage learners to consider ethical implications of AI use in their projects and studies.

Support Self-Directed Learning with AI:

- Guide learners in setting up personalised learning goals using AI tools and tracking their own progress.
- Encourage learners to use AI resources for independent research and exploration.

Share Success Stories of AI in Learning:

- Share examples and case studies where AI has positively impacted learning, both within and outside the classroom.
- Encourage learners to share their experiences and insights from using AI for their learning.

Progression	Proficiency statements
Newcomer (A1)	• **Basic Awareness:** Understands the potential of AI to support diverse learning needs. • **Initial Engagement:** Begins to explore AI tools that can aid in personalising learning experiences, such as adaptive learning software. • **Learning about AI's Role:** Gains knowledge about how AI can empower learners, especially those with special educational needs.
Explorer (A2)	• **Active Exploration:** Actively explores and tests various AI tools to support differentiated learning and assess their impact on student engagement. • **Basic Implementation:** Starts implementing simple AI tools in the classroom to assist learners with varying needs. • **Feedback and Adjustment:** Seeks feedback from learners on AI tools and makes necessary adjustments to better meet their needs.
Integrator (B1)	• **Regular Application:** Regularly uses AI to support and enhance personalized learning experiences and cater to diverse learner needs. • **Data-Informed Strategies:** Utilizes data from AI tools to inform instructional strategies and support individual learning paths. • **Collaboration and Sharing:** Shares experiences and strategies for using AI to empower learners with peers and contributes to professional learning communities.
Expert (B2)	• **Advanced Implementation:** Skillfully integrates advanced AI tools to provide comprehensive support for personalized learning and special needs. • **Innovative Pedagogical Approaches:** Develops and implements innovative pedagogical approaches using AI to empower learners. • **Professional Development Leader:** Leads professional development sessions or workshops on using AI to empower learners, sharing expertise with other educators.

Progression	Proficiency statements
Leader (C1)	• **Strategic Planning and Implementation:** Strategically plans and implements AI integration to empower learners across curricula and educational programs. • **Mentorship and Advocacy:** Acts as a mentor and advocate for the effective use of AI in empowering learners, guiding colleagues and influencing policy. • **Systemic Improvement:** Leads initiatives that significantly improve learner empowerment through AI, impacting educational standards and practices at an institutional or wider level.
Pioneer (C2)	• **Pioneering Innovations:** Contributes original ideas or research in the field of AI for learner empowerment, advancing the field. • **Influencing Educational Policy:** Influences policy and practice at a systemic level, driving transformative changes in how AI is used to empower learners in educational settings. • **Thought Leadership:** Recognised as a thought leader in the use of AI for empowering learners, shaping the future direction of educational practices and frameworks at a national or international level.

Incorporating Artificial Intelligence (AI) in empowering learners offers many benefits but also presents several challenges that educators and institutions must navigate

Challenges

Personalisation vs. Standardisation:

- While AI has the potential to personalise learning experiences based on individual student needs and preferences, achieving this balance can be challenging. There's a risk of AI-driven personalisation leading to a fragmented curriculum where the core educational standards might be overlooked.
- Ensuring that AI personalisation aligns with educational goals and standards while catering to individual differences is a delicate balancing act.

Equity and Access:

- AI tools can exacerbate educational inequalities if some students have less access to technology than others. This digital divide can limit the effectiveness of AI in empowering all learners.
- Ensuring equitable access to AI tools and technologies is essential, particularly for students in under-resourced communities or those with special educational needs.

Data Privacy and Ethical Concerns:

- The use of AI in education involves handling sensitive student data, raising concerns about privacy and security. There's a need for strict data protection measures to ensure student information is not misused.
- Ethical considerations, such as how AI recommendations influence student choices and learning paths, also pose significant challenges.

Dependency on Technology:

- Over-reliance on AI tools for learning can lead to a decrease in critical thinking and problem-solving skills, as students might become too dependent on technology for answers and insights.
- Encouraging independent thinking and ensuring that learners develop critical skills alongside using AI tools is necessary.

Teacher Preparedness and Training:

- Educators need to be adequately trained to integrate AI tools into their teaching effectively. This includes not only understanding how to use these tools but also how to guide students in using them responsibly.
- Professional development and ongoing support are needed to equip teachers with these skills.

AI Literacy and Understanding:

- Students need to be taught AI literacy, including how AI works, its limitations, and its broader societal implications. Developing this understanding is crucial for empowering learners to use AI tools effectively and responsibly.
- Integrating AI literacy into the curriculum can be challenging, especially in educational systems with rigid curricula.

Balancing Technology with Human Interaction:

- While AI can provide tailored learning experiences, it cannot replace the nuances of human interaction, mentorship, and emotional support that educators provide.
- Finding the right balance between technology and human-led teaching is crucial for holistic learner empowerment.

Evaluating the Impact of AI on Learning:

- Assessing the effectiveness of AI in enhancing learning outcomes can be challenging. Continuous monitoring and evaluation are required to determine the impact of AI tools on learner engagement and achievement.
- Making adjustments based on these evaluations to optimize the use of AI in education requires a flexible and responsive approach.

Facilitating Learners' Digital Competence

Artificial Intelligence (AI) plays a crucial role in facilitating learners' digital competence, an essential skill in today's increasingly digital world. By integrating AI into educational practices, educators can provide students with a comprehensive understanding of digital technologies, including how to use them effectively and responsibly. AI-driven educational platforms and tools offer an interactive and engaging way for students to develop digital skills. These platforms can simulate real-world digital environments and challenges, allowing students to learn by doing. For instance, AI can be used to teach coding and programming through interactive exercises that adapt to each student's learning pace. Additionally, AI enhances digital literacy by exposing students to data analysis, online research, and digital content creation, preparing them for the demands of the modern workforce. Through these experiences, students not only learn about technology but also how to apply it creatively and critically in various contexts.

AI is instrumental in teaching the ethical and responsible use of digital technologies. Educators can use AI to simulate scenarios that require students to navigate digital privacy, cybersecurity, and ethical dilemmas, fostering a deeper understanding of the implications of technology use. This aspect of digital competence is critical, as it prepares students to deal with the complexities of data privacy, misinformation, and the ethical use of AI in their daily lives. Furthermore, AI can help students develop critical thinking skills by teaching them how to analyze and interpret information from digital sources, discerning between credible and unreliable content. By integrating AI into the curriculum, educators not only enhance students' technical skills but also empower them to be discerning, ethical, and responsible digital citizens. In this way, AI serves as a powerful tool in equipping learners with the comprehensive digital competence necessary to thrive in an increasingly digital world.

Facilitating Learners' Digital Competence

Activities

Develop AI Literacy Curriculum:

- Design and implement lesson plans that include AI literacy, covering basic AI concepts, applications, and ethical considerations.
- Use interactive tools and resources to make learning about AI engaging and accessible.

Organize Critical Thinking Workshops:

- Conduct workshops or discussions on critically evaluating digital content, focusing on how to discern and question AI-generated information.
- Encourage students to debate and discuss the impact of AI on information and media.

Teach Online Safety and Ethics:

- Integrate lessons on digital citizenship, focusing on ethical AI use, data privacy, and security.
- Use real-life scenarios and role-playing activities to reinforce safe and responsible AI interactions.

Facilitate AI-Based Projects:

- Encourage students to undertake projects that utilize AI tools, fostering creativity and innovation.
- Provide guidance and resources for students to explore AI in various contexts, from art and music to science and mathematics.

Host AI Guest Speakers and Field Trips:

- Invite experts in AI and digital technology to speak to students about real-world applications and career opportunities.
- Organize field trips to tech companies or institutions where AI is being innovatively used.

Implement AI Tools for Learning:

- Use AI-based educational software and platforms to enhance classroom learning and provide personalized learning experiences.
- Encourage students to use AI tools for research, collaboration, and self-directed learning.

Collaborate on Interdisciplinary AI Projects:

- Foster interdisciplinary projects where students can apply AI in different subject areas, integrating technology with arts, sciences, humanities, etc.
- Showcase student projects to the school community to demonstrate the diverse applications of AI.

Progression	Proficiency statements
Newcomer (A1)	• **Basic Awareness:** Understands the fundamental role of AI in developing digital competence and its potential impact on learners. • **Initial Engagement:** Begins to introduce basic AI concepts and tools in the classroom, fostering initial digital literacy. • **Learning about Digital Trends:** Actively seeks information on how AI is shaping digital competence and its relevance to education.
Explorer (A2)	• **Exploratory Integration:** Experiments with integrating AI tools in teaching to enhance digital literacy, such as using simple coding platforms or AI-driven educational software. • **Foundational Teaching:** Starts teaching foundational AI concepts to students, emphasizing the importance of digital skills in the modern world. • **Feedback and Adjustment:** Seeks feedback from learners on AI-based activities and makes necessary adjustments to support digital competence development.
Integrator (B1)	• **Regular Application:** Regularly incorporates AI tools and concepts in teaching to advance students' digital skills and understanding. • **Data-Informed Instruction:** Uses data from AI tools to inform and adapt teaching strategies, supporting varied digital learning needs. • **Collaborative Learning:** Encourages collaborative learning projects using AI, fostering digital problem-solving and creativity among students.
Expert (B2)	• **Advanced Implementation:** Integrates advanced AI applications in teaching, offering deep insights into digital competence, including data literacy and ethical AI use. • **Innovative Curriculum Design:** Designs and implements innovative curricula that incorporate AI to develop sophisticated digital competencies. • **Professional Development Contributor:** Leads training sessions on integrating AI into teaching to develop digital competence, sharing expertise with other educators.

Progression	Proficiency statements
Leader (C1)	• **Strategic Implementation:** Plays a strategic role in the broader integration of AI in educational programs to enhance digital competence. • **Mentorship and Advocacy:** Acts as a mentor and advocate for incorporating AI in education, guiding colleagues in developing digital competencies. • **Systemic Impact:** Leads initiatives that significantly improve digital competence education through AI, influencing standards and practices at an institutional or wider level.
Pioneer (C2)	• **Pioneering Innovations:** Contributes original research or innovative practices in AI for digital competence education, advancing the field. • **Influencing Policy and Practice:** Influences policy and educational practice at a systemic level, driving transformative changes in digital competence education. • **Thought Leadership:** Recognized as a thought leader in the integration of AI for digital competence, shaping educational practices and frameworks at national or international levels.

Integrating Artificial Intelligence (AI) in facilitating learners' digital competence brings several challenges that educators and institutions must address

Challenges

Ensuring Equal Access and Addressing the Digital Divide:

- A primary challenge is ensuring all students have equal access to AI technologies. The digital divide can leave some learners behind, particularly those from under-resourced communities or schools.
- Equitable access to technology and internet connectivity is essential for all students to benefit from AI-enhanced digital learning.

Data Privacy and Security Concerns:

- The use of AI in education often involves processing and analysing large amounts of student data. This raises significant concerns about data privacy and the security of student information.
- Institutions must establish stringent data protection policies and ensure AI systems comply with privacy laws and ethical standards.

Balancing Technology with Human Elements:

- While AI can significantly enhance digital learning experiences, there is a challenge in balancing technological interactions with the human elements of education, such as teacher guidance and peer collaboration.
- It is essential to maintain a human-centered approach in education, where AI complements rather than replaces human interaction.

Developing AI Literacy and Critical Thinking:

- Another challenge is ensuring that learners not only know how to use AI tools but also understand how they work, their limitations, and their broader implications.
- Educators need to foster AI literacy, critical thinking, and ethical reasoning regarding technology use among students.

Teacher Preparedness and Professional Development:

- Educators must be adequately prepared and trained to integrate AI into their teaching effectively. This includes understanding AI technologies and staying updated on the latest developments.
- Continuous professional development is needed to equip educators with the skills to teach digital competence effectively.

Keeping Pace with Rapid Technological Changes:

- The fast pace of technological advancement in AI can make it challenging for educational curricula and teaching methods to keep up.
- Educators and institutions must remain adaptable and responsive to integrate new technologies and approaches effectively.

Assessing the Impact of AI on Learning:

- Evaluating the effectiveness of AI tools in enhancing digital competence can be complex. Continuous monitoring and assessment are required to understand their impact on learning outcomes.
- Adjustments based on these evaluations are necessary to optimize the use of AI in teaching digital competence.

Ethical and Societal Implications:

- Teaching about AI's ethical and societal implications is crucial but can be challenging. Topics like algorithmic bias, AI in decision-making, and future job implications need to be addressed.
- Educators must be prepared to engage students in discussions about these critical issues.

TRANSVERSAL SKILLS FOR EDUCATORS

Transversal skills, also known as soft skills or 21st-century skills, are crucial for educators to effectively integrate and utilise Artificial Intelligence (AI) in their teaching practices. These skills complement technical knowledge and are essential for navigating the complexities and dynamic nature of AI in education.

Key transversal skills include:

Digital Literacy:

- **Understanding AI Tools:** Basic proficiency in using digital tools, including AI technologies, for various educational purposes.
- **Navigating Digital Platforms:** Comfort with navigating and utilizing various digital platforms that incorporate AI functionalities.

Critical Thinking:

- **Evaluating AI Outputs:** The ability to critically assess the information and results generated by AI systems.
- **Identifying Biases:** Recognizing potential biases in AI algorithms and understanding their implications in educational contexts.

Problem-Solving:

- **Innovative Solutions:** Using AI to develop innovative solutions for educational challenges.
- **Adapting to New Scenarios:** Ability to adapt AI tools to new teaching scenarios and learner needs.

Ethical Awareness:

- **Understanding Ethical Implications:** Comprehending the ethical considerations of using AI, including privacy, data security, and equity.
- **Promoting Responsible Use:** Fostering a culture of responsible and ethical use of AI among students.

Lifelong Learning:

- **Continuous Learning:** Commitment to continuously updating one's own knowledge and skills in the rapidly evolving field of AI.
- **Adapting to Technological Changes:** Being open to and proactive about learning new AI technologies and methodologies.

Communication Skills:

- **Explaining Complex Concepts:** Ability to simplify and explain complex AI concepts to students and stakeholders.
- **Interdisciplinary Collaboration:** Effective communication with IT professionals and other stakeholders for AI integration.

Collaboration and Teamwork:

- **Working with Others:** Collaborating with other educators, IT staff, and students on AI-related projects.
- **Peer Learning:** Engaging in collaborative learning with peers to share AI-related knowledge and experiences.

Creativity and Innovation:

- **Creative Teaching Strategies:** Incorporating AI into creative and innovative teaching strategies.
- **Encouraging Student Creativity:** Using AI to foster creativity among students.

Emotional Intelligence:

- **Understanding Student Emotions:** Recognizing and responding to the emotional and social implications of AI for students.
- **Socio-emotional Support:** Providing emotional support in an AI-enhanced learning environment.

Adaptability and Flexibility:

- **Responding to Change:** Being flexible in adapting teaching methods as AI tools and applications evolve.
- **Experimentation:** Willingness to experiment with and learn from new AI applications in education.

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