AI COALITION 4 NL

TALENT, KNOWLEDGE & SKILLS

ADVISORY DOCUMENT

THE TRANSITION TO INSTITUTION-WIDE AI EDUCATION

Challenges, lessons and experiences from higher education practice.

PROJECT GROUP TEACHING & EDUCATION

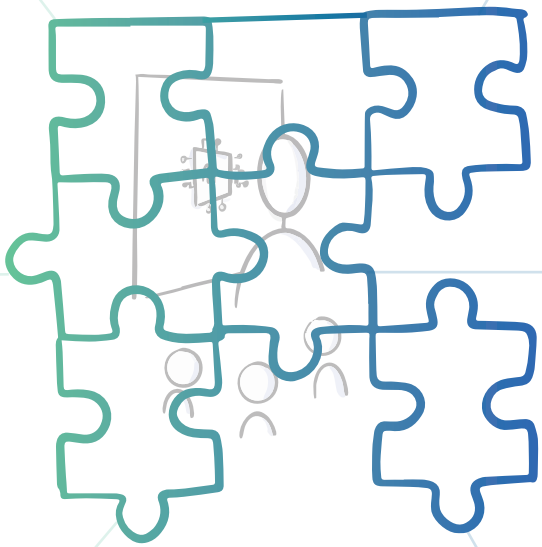
APRIL 2025

AIC4NL

This document provides insights and practical tips on how higher education institutions can effectively integrate AI education into their curricula for students. It addresses six key themes that play a central role in this transition, identifies challenges, shares lessons learned, gives practical examples and outlines follow-up steps that institutions are now working on.

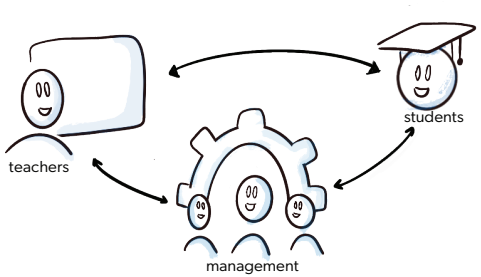
AI in Higher Education

Shaping AI education feels like putting together a puzzle: each theme is a unique puzzle piece that contributes to the bigger picture. There are different themes that can help shape AI education within institutions. This overview provides a starting point and can support discussions and further development.



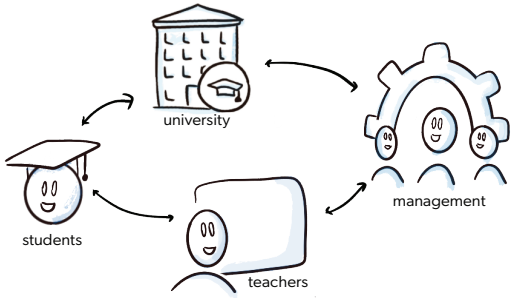
Community

Sharing knowledge and experiences between teachers, students, and support departments strengthens AI education and encourages collaboration and networking within and between institutions.



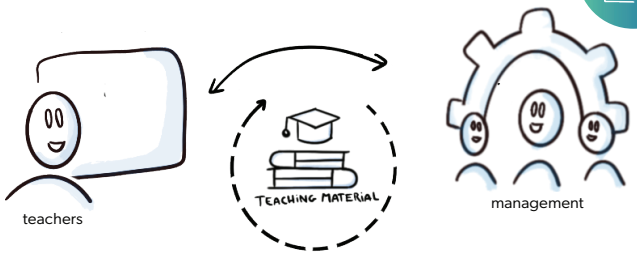
Commitment

AI education within institutions requires collaboration and support from various levels to increase involvement and ensure sustainable commitment.



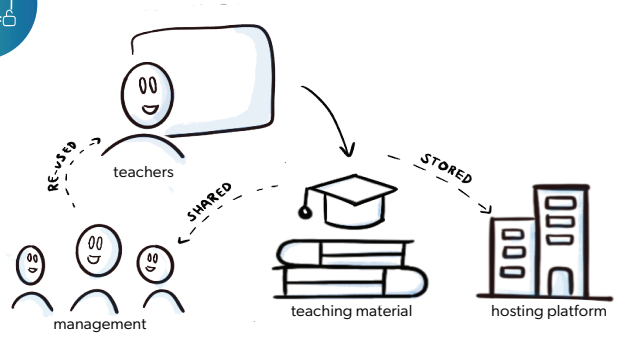
Curriculum

AI education can be integrated into the curriculum in various ways. Institutions make choices about the form and extent of integration, depending on educational goals, available expertise, and relevance to different subject areas.



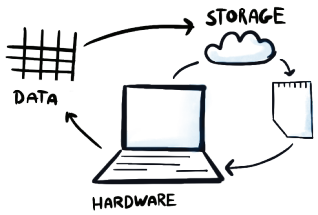
Open Educational Resources

Open educational resources provide the opportunity to make educational content widely accessible and reusable. This promotes knowledge and collaboration between institutions and teachers, while also offering flexibility in how AI education is shaped.



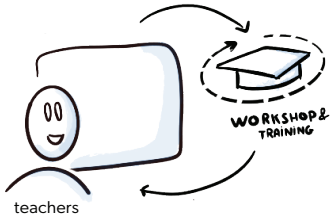
Technical Infrastructure

The availability of data, software, and computing power plays an important role in AI education. Well-organized technical infrastructure supports teachers and students in developing knowledge and skills in the field of AI.



Professionalisation

Support and training help teachers to shape AI education effectively. Professional development should align with the various needs and levels within the institution.



AIC4NL

Executive Summary

This advisory document, drawn up by the Teaching & Education work group, gives guidelines and examples from practical experience for integrating AI education into higher education. It highlights the urgency of AI knowledge in various sectors and provides a framework to help institutions implement AI education effectively. The document focuses on 'teaching about AI' rather than on using AI as a tool for designing education more efficiently or for using AI in the context of testing or fraud.

Main Findings

The transition to AI education requires a collective effort by teachers, students, management and social partners. The involvement of these stakeholders is crucial for the lasting integration of AI education. The document is structured around six key themes: commitment, curriculum, community, professionalisation, open educational resources, and technical infrastructure. Each theme offers an understanding of the challenges and opportunities that institutions face when implementing AI education.

Commitment

Involvement of all stakeholders is essential. Successful integration requires strategic support and a clear vision from management.

Curriculum

AI education can be integrated into curricula in various ways, ranging from separate subjects to integration into existing courses. The choice depends on the available expertise and how rapidly innovations can be implemented. This paper gives examples of institutions that have successfully integrated AI education and stresses the importance of a coherent curriculum.

Community

Connecting teachers, students and supporting staff within an educational community encourages knowledge sharing and collaboration. Initiatives such as digital cafés and lunch lectures help share best practices and promote innovation.

Professionalisation

Professionalisation of teachers and support staff is needed if the quality of AI education is to be ensured. Institutions are encouraged to offer tailor-made courses that meet the specific needs of their staff.

Open Educational Resources

The use of open educational resources (OER) makes AI education more accessible and saves on costs. However, there are challenges in developing and implementing OER, such as copyright and the fragmentation of platforms. You will find successful examples of how to ensure quality and enable accessibility of OER in this document.

Technical Infrastructure

Access to the right capacity, technology and data is a key requirement for successful AI education. Institutions need to invest in infrastructure and ensure secure access to datasets. This paper describes examples of collaborations between educational institutions and companies to improve access to relevant data.

Key Conclusions and Recommendations

Engagement: Ensure broad commitment from all stakeholders to implement AI education effectively.

Curriculum development: Provide flexible options for integrating AI into curricula, tailored to student needs and available expertise.

Community building: Encourage collaboration and knowledge sharing between teachers and students through networking and initiatives.

Professionalisation: Invest in targeted professionalisation programmes for teachers to ensure quality teaching.

Open Educational Resources: Develop and share open educational resources with attention to copyright and quality standards.

Infrastructure: Improve access to technical facilities and datasets to enable practice-based learning.

Following these recommendations will let educational institutions lay a solid foundation for integrating AI education and will prepare students for the challenges of a technology-driven future.

Introduction

With demand for AI knowledge and skills increasing in almost all sectors, education about AI from within the curricula of various disciplines is becoming ever more important. Not only AI specialists but also professionals in other fields need to develop knowledge about AI to let them play a part effectively in an increasingly technology-driven world and navigate through it [1]. This advisory document focuses specifically on **how institutions can take steps to offer education about AI within various courses**

It is important to distinguish between two different ways in which the term 'AI in education' (figure 1) is used:

1. **Teaching with AI (AI as a tool in education):** using AI techniques such as adaptive learning platforms or automated assessment systems to support and improve the teaching process.
2. **Teaching about AI (AI as a subject within education):** developing teaching materials, courses and programmes that teach students about AI techniques, their applications and their impact.

This document focuses exclusively **on the second topic: how education about AI can be offered as part of the teaching within various disciplines, outside specialist AI courses.** It does not address how the advent of AI might disrupt existing teaching and testing, nor does it address the use of AI technology as a tool within the educational process. If you are interested in these topics, please refer to the documents published last year by the AI Coalition 4 NL 's Training & Education Working Group: Advice on generative AI-tools in primary and secondary education or Advice on generative AI tools in MBO, HBO and WO.

A successful transition for an institution to teaching about AI requires more than just well-designed curricula. It requires a broadly-based commitment from the faculty, students, management and social partners. Their involvement and backing are the cornerstones for long-lasting embedding of education about AI. This paper therefore has a broader scope than just curriculum development.

Who is this document intended for?
This document has been written for anyone who plays a role in the transition to AI education within an educational institution, whether from a management position, as a coordinator or perhaps as a teacher in a pioneering role. It offers tools and practical experience that can help this transition.

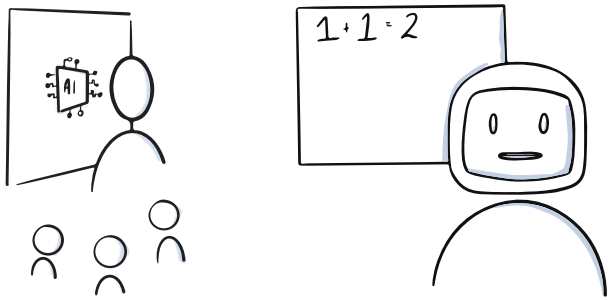


Figure 1: How AI can be used in education

1 AI Is mensenwerk: Beleid 2020

This document gives an overview of the conditions, opportunities and challenges, as well as practical examples of introducing AI education within programmes. It is intended as inspiration and an impetus to let institutions translate AI education into their own organisations and programmes. The advice is structured around six themes:

- COMMITMENT
- CURRICULUM
- COMMUNITY
- PROFESSIONALISATION
- OPEN EDUCATIONAL RESOURCES
- TECHNICAL INFRASTRUCTURE

Figure 2: Theme's used in this document

Background

This document is the result of a series of monthly online meetings that brought together delegates from various higher education institutions. During these sessions, they presented their findings and discussed the various topics around promoting AI education within educational institutions. In November 2024, the series of online meetings concluded with a face-to-face morning meeting where the first version of this document was discussed, which was then improved in several online rounds, during which participants jointly added to the document. Sharing knowledge and experience, let us gather the understandings and practical examples that constitute a shared vision and approach for strengthening education about AI in a variety of courses.

Although this paper focuses primarily on higher education (HBO and WO), we believe that the insights may also be relevant for intermediate vocational education (MBO). Representatives from MBO were present from time to time at the discussions, but the applicability of the advice in this paper has not been extensively considered in the context of MBO programmes. Further exploration is presumably needed for this.

Acknowledgements

While creating this advisory document, we were fortunate to be able to count on the valuable contributions of a diverse and expert group of professionals. We would therefore like to express our sincere thanks to everyone who contributed ideas, substantive input and expertise.

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Content

Commitment

Involvement, dedication and commitment (hereinafter "Commitment" for short) play a key role in successfully integrating AI into educational programmes. It requires strategic support and a visible profile from management to drive and secure AI initiatives within the various layers of an educational institution.

Challenges

One of the key challenges is creating sustained engagement with all stakeholders. Teachers and management must immerse themselves in the often complex AI material and must be prepared to translate it to their own disciplines. This also involves the challenge of striking a balance between AI that is relevant to specific disciplines and general AI knowledge. Furthermore, convincing stakeholders requires time and resources, while the urgency of AI education is increasing. Maintaining long-term support as policy objectives change is also proving difficult.

Complexity of large organisations:
Within large organisations, there are often many loose AI initiatives. This can lead to a shortfall in the overview and coordination. It is important to strike a balance between retaining the energy of individual initiators and providing structure from a central driving force. Too much freedom can lead to fragmentation, but excessively tight rules can discourage initiators. Facilitating and giving direction to this energy is therefore crucial.

Broader perspective on engagement:
Besides teachers and management, other groups also play an important role in creating and providing AI education, for instance students, support staff, IT departments, knowledge centres and parents in senior secondary vocational education. It is important that these groups are explicitly listed and involved in the process.

Clarity and backing:
Management should not only encourage experimentation but should also provide clear guidelines and a mandate. This creates trust and encourages initiators to take steps rather than falling silent due to uncertainty. It is also important that domain experts (not just AI specialists) are given sufficient time and scope in their work planning. They play a crucial role in moving beyond experiments and towards lasting and practical solutions.

Experience and lessons from practice

- **Appoint a central promotor/driver and establish a variety of active networks:** A central promotor gives a face to the transition and makes it possible to bring together various AI-related initiatives within the institution and connect them to the outside world. It is important to involve the various stakeholders such as directors, policy support, education experts, coordinators, lecturers and students in order to develop the broadest possible backing for the transition.
- **Link AI education to broader themes:** Because AI also has an impact on other issues within institution besides education, it is a good idea – for alignment and momentum –to make connections between staff involved in other aspects of AI transition in the organisation, e.g. in testing, AI deployment in education or in operations, as well as in compliance with legislation such as the AI Act.
- **Increase visibility:** Advice on generative AI tools in primary and secondary education
- **Stakeholder overview:** Make it clear to everyone who does what can help them find each other and make agreements.

Practical examples

At **TU Delft** , the first step toward obtaining management commitment and engagement from the top down was taken by appointing a central promotor, Pro-Vice-Chancellor Geert Jan Houben. This initiative included not only AI but also the aspects of data and digitalisation, to broaden the issue so as to create more opportunities to connect with projects. Appointing a person as the face and leader of the transition helps to increase the visibility of the transition within the institution.

At **Utrecht University of Applied Sciences**, a digitalisation steering group has been formed, led by a member of the Executive Board and including directors of various educational institutes and knowledge centres. There are several ambassadors from education and research who share their knowledge and experience relating to AI through events and the internal Digital Academy.

At **Rotterdam University of Applied Sciences**, there is the AI & Ethics innovation programme that focuses on experimentation and visibility. There is also the AI & Immersive Steering Group, which consists of strategic policy staff, professors steered by the Director of Digitalisation. This steering committee is linked to the Generative AI working group, which consists of various HR-wide employees. This is where policy is developed and insights from the organisation are fed back to the steering committee. There is also a Datalabs coordinator, through whom several data labs are being set up to guarantee the infrastructure.

At the **Amsterdam University of Applied Sciences** , the Centre of Expertise for Applied AI (CoE AAI) was set up in 2021, which research is carried out in co-creation with partners in seven applied labs, looking at the impact of AI on work. The CoE AAI fulfils one of the three strategic themes in the institution's plan (three Ds: durability, digitalisation and diversity/inclusion). A separate programme called Education with AI' was implemented in 2023 and 2024 from which e-learning, information sessions and policies on the use of generative AI in education emerged.

In the AI4Students project, a methodology was developed for teachers themselves to work on making their curriculum AI-ready. AI4students: An explanation of the methodology.

Next steps

The institutions involved are in the midst of a transition and are working on follow-up steps. They need continued strategic backing and visibility from the management, as well as the involvement of relevant stakeholders in order to maintain and strengthen support among students, teachers and supporting staff. During the various transition phases, when activities shift from exploration and experimentation to adoption within regular processes, the commitment required from parties such as the management also changes. This ranges from initiating and facilitating innovation to actively integrating, scaling up and adjusting innovations. For those guiding the transition, obtaining and maintaining commitment remains an ongoing concern.

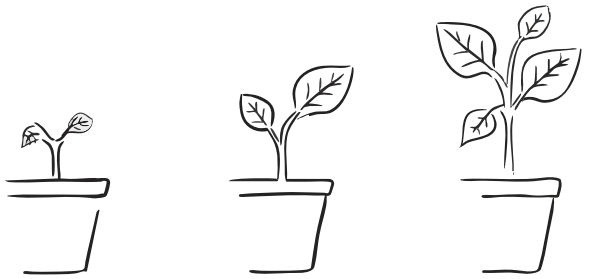
Curriculum

The form that teaching about AI takes can vary in students' curricula. Thinking about the curriculum provides an opportunity to consider AI education in its overall context in relation to learning objectives, teaching activities and assessment, as well as building up students' knowledge and skills through the programme.

Challenges

An important question for the form that AI education in the curriculum takes is whether AI will be offered as an independent subject with its own expertise or woven into other subjects. What may come into play here is the availability of expertise for providing the education and how fast circular innovations can be introduced.

Figure 3 shows three conceptual schools of thought for the curriculum in this context. While they can be viewed as three separate directions, they can also be seen as successive stages for embedding AI education in the curriculum. If the institution wants to progress relatively quickly to offering AI education, it could offer it in a minor, for example (figure 4). This has the advantages that it becomes a stand-alone programme that is immediately accessible to students from different courses, no curriculum changes are needed, and it only requires a relatively small group of teachers with AI expertise. A limitation is that it is optional, so there is no guarantee that students will take the AI course.



AI education outside both the curriculum and the discipline

AI education within the curriculum but outside the discipline

AI education within both the curriculum and the discipline

Figure 3: Possible progression for AI education in the curriculum

A second line of thought, therefore, is to include an AI subject as a regular part of the course itself. The availability of AI experts can determine whether this subject is taught by a small group of AI experts who offer the subject for multiple programmes, or whether the programme's own lecturers provide the AI teaching, which has the added advantage that the content of the teaching can be related to the programme's own domain. The TU Twente practical example also shows that variations on these two schools of thought are possible.

Finally, there is the third school of thought, which no longer sees AI education as a separate subject, but instead integrates it within subjects and has it taught by subject teachers themselves, who can then also clearly state how AI can be used within their own subject area.

While each mindset has its own advantages and disadvantages, they also differ in the time and space required for teachers to immerse themselves in AI and convert it meaningfully into the context of the course. Available time and resources, and the choice of whether to offer AI education quickly or take the time to integrate AI fundamentally into the courses can determine the approach to adopt.

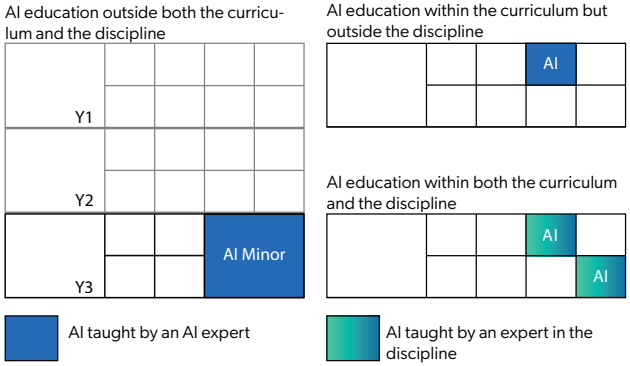


Figure 4 : Possible ways of embedding education about AI in the curriculum

Experience and lessons from practice

- **Let students choose topics themselves to make AI education relevant within their own studies:** Examples include using different datasets in exercises or allowing students to choose topics or challenges, such as working with different types of data (structured, text, images, sensor data, video, etc). Within this framework, students can learn AI skills or data science skills that are relevant to their studies.
- **Work with challenge-based learning**: Working with real-world problems helps students develop AI skills and knowledge that are relevant within the context of their studies.
- **Develop AI curricula in the courses:** When AI is taught at multiple points in courses, establishing a learning line can help ensure consistency by aligning teaching and bringing teachers together.
- **Make AI more attractive by linking it with applications:** Since this is non-specialist AI education, it helps students if education is focused on the practical application of AI. This approach makes education relevant, as well as encouraging students' interest in AI and their potential desire to specialise in it.
- **Involve teachers in making their curriculum AI-ready:** After introducing them to the various possibilities of AI (incl. generative AI), get teachers to work themselves on the impact of AI on their field of work; this creates not only awareness but also involvement.

Practical examples

The **University of Twente** introduced and opened the "Data Science" master's course to all UT master's programmes in 2013, based on the idea that every student should have the opportunity to learn about this revolutionary technology. Over the years, this education – which is provided from Computer Science – has been explicitly included as a compulsory or elective subject in various master's programmes, numerous elective units and projects have been developed, it is taught three times a year and (for scaling up) the teaching team has been expanded from within various programmes[2]. The management of master's programmes of the EEMCS faculty has introduced DS-focused specialisations in four master's programmes, each with its own aligned focus, as well as subjects that share content with each other. In recent years, many DS&AI courses have been developed in the bachelor's and master's programmes as well as a minor, "DS&AI: seeing through the hype".

The Brabant universities of applied sciences – **Fontys, Avans, BUas and HAS** – and the Province of Noord-Brabant have joined forces to make AI and data literacy accessible to all students at Brabant universities of applied sciences. Under the name BrabantAI4Students, they are jointly developing and implementing generic learning outcomes and supporting learning activities for the various fields for which they provide training.

Wageningen University has experience with all three possible AI embedding options shown in figure 3. In 2016, WUR introduced a minor for undergraduates that is taught by the Computer Science chair group. In 2019, ten new Data Science and AI courses were developed and deployed in existing education as specialisations or tracks. Some of those courses were linked to WUR disciplines by offering discipline-specific data and cases to the students as part of the course. In 2021 and 2024, two new programmes were started – a master and a bachelor – in which DS/AI subjects are taught by both AI and domain experts.

The advantage is that students can bridge the gap between AI and their discipline by always using DS/AI in the context of one or more WUR disciplines, for example Nutrition and Health, Plant or Animal Research.

The Amsterdam University of Applied Sciences 's mission is to make all HvA students AI-ready. They train students along three lines: AI experts, AI applicators and AI interpreters. For example, the AI experts follow the Applied AI master, the Digitally Driven Business master and the Applied AI minor. In addition, AI appears as a topic in many courses (including HBO-ICT, Engineering and Smart Media Production). Finally, the aim is to give all students a foundation in AI literacy – how does a language model work, what are the risks of using it (bias, hallucinations), what are the alternatives to using AI. In the AI4Student project, teachers themselves engage in co-creation sessions to determine the impact of AI on their field of work. This will allow recommendations to be drawn up to make the curriculum (and

Next steps

Because AI is a broad church with many topics, a recurring question is what should be taught about AI. This question arises in different ways under the three schools of thought outlined. With a central solution that is independent of the course studied, the question is what is relevant to all courses. When the AI education on offer is more in the context of a specific study, the question of what is relevant to the study changes. In the latter case, future research could answer this question by discipline by bringing together clusters of courses to answer this question collectively.

2 van Keulen, M., Seifert, C., Poel, M., & Oudshoorn, C. (2020). Scalable Interdisciplinary Data Science Teaching at the University of Twente. Berlin Journal of Data Science

Community

Access must be created within the entire education system to implement AI in education. This involves the entire community (administrators, coordinators, teachers, support staff and students). The administration should be open to innovation and help organise this and facilitate teachers in implementing change in their teaching. It is also important to encourage students to take AI-related electives and make them enthusiastic about it. When students proactively take responsibility for their own learning and show interest in AI topics, it motivates lecturers and creates a positive energy within the community.

Challenges

A key challenge is connecting teachers. Whereas the innovation during an early stage mainly consists of the work of a few enthusiasts, the pioneers, a structural transition needs increasing stakeholder involvement so that knowledge and experience can be shared, as well as inspiring and motivating each other. This is about bringing together not only teachers but also supporting services such as IT services and legal experts such as privacy officers to ensure data security in education initiatives. These stakeholders need time, resources and organisational backing to participate in the process.

Experience and lessons from practice

- **Low-threshold, teacher-led communities:** At the University of Twente, communities are led by teachers/researchers themselves. Here, regular meetings are organised to exchange experiences and best practices. Similarly, TU Delft has a community specifically for lecturers from different faculties who teach machine learning: the Machine Learning Teachers Community.
- **Financial and organisational support:** Small budgets and assistance from project managers help teachers focus on content and didactics. This relieves the burden on teachers and encourages teaching innovation.
- **Diversity and initiatives:** Utrecht University of Applied Sciences facilitates wide acceptance of new technologies by offering various initiatives such as workshops, digital cafés, and virtual and physical meetings.
- **Access to educational resources and best practices:** Development of platforms for sharing educational resources ensures that teachers have easy access to relevant resources and examples to effectively integrate AI into their lessons.

Practical examples

At **Utrecht University of Applied Sciences,** initiatives such as digital cafés and Teams groups are led by lecturers, promoting the exchange of knowledge and ideas.

At the **University of Twente,** several communities have organised themselves into formal networks, e.g. the "AI and Data in Education (AID-E)" network. The UT-wide Digital Society Institute (DSI) encourages cross-disciplinary collaboration and relieves the burden on the networks with event organisation, coordination and external communication. Faculties have made stimulus funds available for the establishment of the various labs. These collaborations are at the forefront of innovations in terms of both research and education.

Fontys started building the GenAI community in which people from across the organisation who are interested in AI could share knowledge and experiences with each other. Active members from that community now have a role in further professionalising the organisation through e.g. inspiration sessions, workshops and an in-depth training programme developed specifically for education professionals. From the Centre of Expertise for AI for Society, they also hold workshops and training sessions at schools, SMEs and public organisations in the region to increase the region's innovative capabilities.

Rotterdam University of Applied Sciences has a Teams channel with 600 members, in which teachers, students and external partners share knowledge, tips and events. Within the Institute for Teachers, an AI translator has been appointed as a bridge-builder between education, knowledge centres and the professional field. This role focuses on developing generative AI within education programmes, aiming to activate teachers and students and creating human-centred action perspectives that respond to future changes in the professional field.

HAS green academy is involved in Groenpact's Digitalisation and Technology acceleration programme. Groenpact is a partnership of green education institutions (VMBO, MBO, HBO and university), business and government. This acceleration programme plays a significant role in achieving Groenpact's objective by embedding the use of technology more firmly in green education programmes. It focuses on four themes, namely AI, data science, robotics, and sensor technology.

TU Delft is making small grants available to teams of lecturers to develop education about AI-enhanced engineering, design and science, referred to collectively as 'AI Augmented Engineering Education'. These grants aim to accumulate knowledge and skills in 'AI-enhanced science' and how to teach it. There is an additional task of sharing this with other teachers in the institution.

The Amsterdam University of Applied Sciences has an AI student council. This has broad representation from all programmes and year groups. It advises the Centre of Expertise for Applied AI, organises events for students and communicates about AI from a student perspective. There is also a large Teams community (>400 people) where inspiration and experiences are shared about applying AI in the educational context.

Next steps

Among the institutions involved, the initial focus has often been on building communities within their own institutions. Besides continuing to strengthen these, connecting across institutions can promote cross-fertilisation. For example, within the health domain, the relevance of AI education often transcends the education at any individual institution. Exchanging experiences across the boundaries of educational institutions lets us genuinely focus on strengthening specialist knowledge about AI education within a specific discipline.

Professionalisation

Professionalisation is essential within the context of digital transformation and AI education for letting teachers and support staff deliver high-quality AI education. This is especially important when teaching about AI is provided by teachers from specific disciplines rather than AI experts. In such cases, it is crucial that these teachers not only acquire the necessary knowledge but also develop experience and confidence in using and applying AI within their discipline. This not only ensures the quality of teaching but also increases teachers' commitment and enthusiasm.

Challenges

Increasing AI and digital competences more broadly among teachers and staff brings several challenges, such as time constraints and motivation issues. Especially in the case when AI is not seen as an important part of the lecturer's field, teachers may tend to give more priority to other developments in their fields. Professionalisation in those cases will then be determined to a large extent by external incentives and backing from the management to motivate teachers to participate in professionalisation programmes about AI in their subject area.

Another challenge is that traditional courses are less effective or popular with researchers because they often do not match their specific knowledge level and needs, as well as because they are used to keeping their professional knowledge up to date through their own research. Furthermore, the speed of digital developments is sometimes so great that a course soon becomes outdated. The lack of topicality or customisation can reduce the motivation. Finally, responsibility for professionalisation often lies with individual researchers, which can hinder collaboration and broader innovation.

Experience and lessons from practice

- **Overarching programmes and support teams:** Programmes such as "Samen Digitaal" at Utrecht University of Applied Sciences and the "AI & Ethics" programme at Rotterdam University of Applied Sciences connect education and the field and provide structural support for digital transformation.
- **Development of learning paths and customised training:** At Avans University of Applied Sciences, 19 different learning paths have been set up to suit the levels and needs of employees. These learning paths contain modules that develop skills step by step, from basic to advanced.
- **Incorporating ethics in digital skills:** Attention is paid to ethics in digital skills. At Avans University of Applied Sciences, ethics was integrated into the data and transversal skills learning paths, with ethics being applied broadly, for instance in privacy issues around large language models.
- **Leadership support: Backing and encouragement from managers plays a cru**cial role. The Teach the Teacher project, which provides AI training for teachers, highlights the importance of this support for successful participation and motivation.
- **Linking up with existing professionalisation activities:** Many institutions already have separate departments for staff professionalisation activities (e.g. Teaching & Learning Centres, Academies). Involve these departments from the very beginning of material development to ensure long-term assurance.

Practical examples

At **Utrecht University of Applied Sciences**, an umbrella programme called "Samen Digitaal" has been set up to link education, research and the professional field around human-centred digitalisation. The programme team works together with the HR Department and networks such as the Teaching & Learning Network to professionalise staff on digital skills. At Avans University of Applied Sciences, there is a similar project, the "Digital Transformation Skills Framework", where 19 learning paths have been developed to guide staff from novice to expert in digital work skills, data, and transversal skills.

Fontys has developed an internal professionalisation programme, Agile Generative AI Professional. Within the programme, Fontys employees can professionalise around responsible use of generative AI. This can be done through a supply-driven programme consisting of a basic workshop and a choice of several in-depth workshops or a personal learning route. Also linked to this are Edubadges at three levels, namely beginner, basic and expert. Employees thus decide for themselves what is relevant to them and what level they want to deepen their knowledge to. Currently, the level that teachers are expected to develop to as part of the Basic Education Qualifications is being examined.

At the **Amsterdam University of Applied Sciences** , professionalisation and activities around educational innovation are housed at the Centre for Teaching and Learning (CTL). A separate online course has been developed for teachers and is available through the ELE (Brightspace). In addition, generative AI has become part of the basic curriculum for the BKO (basic teaching qualification). The CTL has also set up an AI network consisting of educationalists from all faculties who collect questions from the organisation about deployment of e.g. generative AI.

Next steps

Future initiatives at the institutions involved focus on further integration of digitalisation and professionalisation in the staff development cycle, strengthening peer groups further, and setting up interdisciplinary networks. Connecting researchers across disciplines and institutions promotes knowledge sharing, with the aim of introducing lecturers to new developments more quickly. In addition, encouraging co-creation within and outside the academic community can help develop innovative solutions to complex challenges surrounding lecturer professionalisation.

Open Educational Resources

Using open educational resources (OER) lets institutions make AI education widely accessible and save costs by reusing and adapting existing materials.

Challenges

Developing and implementing OER presents some challenges, which depend on the form of education and the rapidly changing context of AI. In higher education (including vocational education), it is difficult to create standards, as teachers often prefer materials they have developed themselves. In addition, the process of sharing OER requires attention to licensing and copyright. While licensing in itself is not time-consuming, preparing materials for open publication can involve additional work. Consider the use of royalty-free images and sources that may be freely shared. This requires careful coordination beforehand to meet the conditions of open educational resources and minimise editing afterwards.

An additional problem is the fragmentation of platforms for higher education. This is in contrast to primary education, where a platform such as Wikiwijs already provides a central place to share educational resources. Fragmentation can also lead to inconsistencies in the quality and accessibility of materials. An additional challenge is clarity as to who is responsible for setting learning objectives and maintenance, which can complicate consistency and accreditation. All these challenges are compounded in the domain of AI, where educational resources are rapidly becoming obsolete due to rapid technological developments.

Copyright

When developing and sharing OER, institutions need to keep copyright issues in mind. Teachers and staff should be aware of the copyright status of the materials they use and share. This requires support in the form of guidelines, training and technical resources.
For images and multimedia, there are tools that can automatically check for copyright, but for text this is more complex. Automatic copyright checks on text are not foolproof and can lead to unjustified markings, such as when detecting whether students' work is their own. Manual checking is therefore often required, for instance by trained student assistants, which can be time-intensive. A careful approach to collecting and annotating sources in advance can help minimise adjustments afterwards.

Although lecturers may state that they themselves responsible, legal liability often remains with the institution. Current legal developments, such as ongoing court cases about sharing study materials (StudeerSnel lawsuit), highlight the importance of having a good policy and central strategy for managing open educational resources.

Within higher education, this topic is being developed further within initiatives such as N puls digital educational resources, where work is being done on guidelines and support for institutions. In addition, the document more control over your own lessons provides a comprehensive overview of the possibilities and conditions when working with OERs.

Experiences and lessons from practice

- **Standardisation and certification:** Platforms such as Wikiwijs allow teachers to share and use open materials. Establishing basic standards for AI certification, such as a "W certification" in HBO, can ensure the quality and consistency of these materials.
- **Flexibility in learning blocks:** The AI Coalition 4 NL has developed a system of modular blocks for AI educational resources, letting users choose materials and adapt them to their specific needs.
- **Licences and ease of use:** Many AI educational resources are available under a Creative Commons CC-BY licence, allowing them to be used, adapted and shared freely, provided that the original creator is credited. This makes it easier for institutions to apply and adapt OER in different educational contexts.
- **Common language and accreditation:** working with a common language and accreditation systems, as in certification for the AI licence, lets institutions use standardised educational resources while still leaving room for adaptation by teachers.
- **An eye on copyright from the start:** It is more effective if teachers already take copyright into account during development. By managing resources carefully, subsequent checking is faster and fewer adjustments are needed.

Practical examples

The **AI Coalition 4 NL** has the AI Finder,which helps users find free AI-related courses.

LOI and Skillsoft both offer learning solutions for higher vocational education. These solutions include not only training materials but also certification.

The Edusource platform shares various open learning resources such as podcasts, lessons and short articles.

Next steps

Future developments around OER could focus on developing an automated and reliable copyright tool for higher education. Such a tool could assist institutions by automatically checking uploads for potential copyright infringements, thereby reducing the need for manual checks. This would make the process of developing and sharing OER more efficient and would promote wider accessibility within education.

Technical infrastructure

AI runs on physical computing technology. In addition to students often using their own computers and laptops, the heavier computational work requires additional computing power. Access to relevant data is also needed. What is important here is that students also learn to use these facilities responsibly, e.g. in terms of data security, as well as efficiently and with responsible energy consumption.

Challenges

The lack of access to high-quality datasets and computing power poses a challenge for AI education. Many companies that students work with do not have usable datasets or are reluctant to share data due to privacy or contractual restrictions. At the same time, students often lack access to hardware or software with sufficient processing power to run complex AI applications, which hampers their learning experience.

Computing power and software:
Educational institutions and companies struggle to provide students with suitable computing facilities. They often set up these scarce facilities primarily for research and not so much for teaching. This leads to challenges, especially in subjects where a large group of students make intensive use of these shared facilities for a short period.

When organising facilities, institutions should also ensure that software licences are available for students to use. In doing so, they should also be aware of which third parties can access the data students share through this software, especially when external parties provide and host the software.

Sharing data with companies:
Companies are reluctant to collaborate due to the lack of available datasets or restrictions on sharing them. They often do not share datasets because of legal restrictions, e.g. NDAs. This hampers access to relevant data for educational purposes and thus limits students' ability to engage in hands-on learning with real data.

Experience and lessons from practice

- **Domain-specific data labs:** Rotterdam University of Applied Sciences has set up several data labs, each with a specific focus (e.g. research or education) and offering domain-specific expertise. This increases scalability and possibilities of use for both students and researchers.
- **Secure cloud solutions:** Collaborations between companies and institutions can be supported by developing secure data-sharing solutions. Tools such as secure data-sharing platforms can reduce corporate reluctance.
- **Research data reuse:** 4TU.ResearchData makes research data available for AI education and promotes a culture of data literacy and transparency. Peer-reviewed data repositories and certification enable students to work with reliable high-quality datasets
- **Synthetic datasets:** Synthetic datasets can provide a valuable solution to the lack of available data. In addition, small, regional language models (LLMs) can be used to complement large models specific to educational needs.

Practical examples

At the **Rotterdam University of Applied Sciences**, several data labs have been set up since 2020 as part of the AI & Ethics programme. These data labs offer a domain-specific approach that facilitates collaboration, research and teaching within different faculties.

Hogeschool Utrecht has a Data Science Pool supporting education and research in deploying data and AI) and Kenniswerkplaats Veilig Data Delen (generic tools and resources to ensure students learn to work safely with data of clients, patients, etc.).

4TU. ResearchData Centre supports research data reuse, allowing students and researchers to access datasets for AI applications within engineering sciences.

TU/e Eindhoven, Tilburg University, the province of Noord-Brabant and the Brabant Development Company (BOM) are working together to provide a high performance computing (HPC) facility

In **Wageningen University, a Wageningen Data Competence Centre (WDCC)** was established in 2018 to promote Data Science and AI in the organisation. One of the important functions of WDCC is bringing together faculty members and staff who know about and/or are interested in AI and provide a platform for exchanging experiences, encouraging each other and also identifying the need for AI within different target groups.

The University of Twente provides infrastructure for teaching and research from a few labs in the various faculties (ITC CRIB, BMS Datalab, EEMCS DS&AI Lab). In addition, there is a central UT-wide facility called JupyterLab funded by both central IT resources and 'donations' from heavy-user disciplines.

ICTS, the IT department of UvA and HvA, has developed its own modular LLM infrastructure (UvA/HvA Chat) that lets lecturers and students use the functionalities of generative AI securely without sending data to a third party and within which various models can be addressed. The environment is now being developed further at SURF in the NPuls project to be made more widely available for higher education.

Next steps

Investing in structural solutions to improve access to computing power and data would promote AI education. Investing in infrastructure such as data centres, powerful workstations and cloud solutions allows students to gain experience of using complex AI applications. In addition, developing synthetic data offers a possible alternative for overcoming the limitations of real datasets, but it is important to establish clear guidelines for both creating and using such datasets.

Further Reading

A list of recommended literature is given below, in the order in which the topics have been discussed. Note that some of these materials are in Dutch:

Introduction

- Video 'What is AI?'
- Video 'AI-competences'
- Maybe a silly question but what is AI anyway?

Commitment

- Developing a model for AI Across the curriculum: Transforming the higher education landscape via innovation in AI literacy. Computers and Education. Artificial Intelligence, 4, 100127 https://doi.org/10.1016/j.caeai.2023.100127
- The AI-impactscan: A methodology for mapping the impact of artificial intelligence in a specific field of work

Curriculum

- Learning to deal with uncertainty in Artificially Intelligent Systems: Looking for human traits

Community

- Rules and advice for students, lecturer-researchers and other educational staff of the Amsterdam University of Applied Sciences. Rules and advice that help apply generative AI (GenAI) innovatively and responsibly.

Professionalisation

- AI Skills
- Journalism and AI
- Digital Learning Materials from Npuls

Open Educational Resources

- Centre of learning material advice: MILK

Technical Infrastructure

- Digital Learning Materials from Npuls
- Public datasets available for education Kaggle

VERSTERKEN VERSNELLEN VERDIEPEN