



# Artificial Intelligence & Learning



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BEYOND KNOWLEDGE\*

## With French origins and an international culture, the Cegos group has always been a keen observer and dedicated player in work and business.

As a European and global leader in Learning and Development, the group continually innovates to guide and support companies as they evolve, and stimulate learners' personal and professional development.

By turning skills into performance, Cegos leads its clients "Beyond knowledge".



Turnkey professional training courses



Tailor-made learning solutions and change support



Business & skills strategy & learning organisation



Training Outsourcing



Digital and blended learning

+250,000

people trained each year

€200

million in revenue

50

countries covered worldwide

20,000

corporate clients

1,100

employees

+3,000

pieces of multilingual digital content available

+310,000

active users on the LearningHub@Cegos

Studies and publications



**The digital revolution and its underlying technology disruptions are sparking far-reaching changes in workers' skills, whether technical, behavioural or line-of-business related.**

**To tackle these upheavals and provide support for facing them, it is now vital for businesses to speed up development of their teams' skills:**

For individuals, having professional agility is a major advantage with knowledge and qualifications being deciding factors in employability.

For companies, Learning & Development is a strategic investment. One that makes the business more competitive in the marketplace and more attractive to employees.

So how can we now foresee and prepare for these deep changes instead of just putting up with them?

**For Cegos, it is defining and building the framework needed for man and machines to work together cleverly and effectively. This has led us to three strong convictions:**

- We are convinced that as technology improves, the strictly human aspects of work are also growing in importance.
- We know that human interaction is vital to in-depth learning.
- In a world where it is increasingly necessary to learn fluidly and efficiently, our purpose is to get the learner involved and ensure their training is impactful and effective.

### The battle of skills: a few statistics

**45%** of jobs are at risk of obsolescence of skills over the next three years, according to European HR directors.

**74%** of them plan to introduce upskilling support programmes for employees in their current job.

**26%** are choosing support programmes in reskilling, developing skills for another line of work.

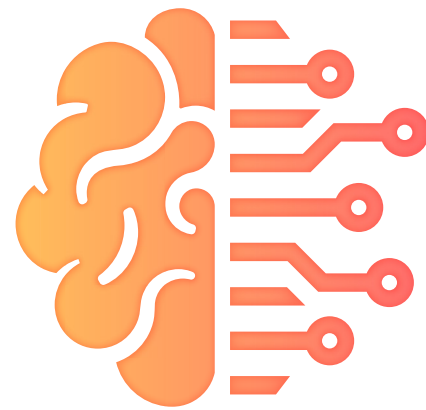
**81%** of European employees think that technological transformations will change the content of their work.

**90%** claim they are ready to train themselves to adjust to transformations in jobs and lines of work.

Source: Cegos Observatory. Study: 'Transformations, Skills and Learning', October 2020.



# Artificial intelligence as part of the learning process



It is becoming increasingly reasonable to place learners and trainers at the heart of training courses based on data provided by digital systems.

Because of this, artificial intelligence is a great opportunity in the short term: it helps the development of key skills and the employability of people in a working world bound to transform profoundly.

Nonetheless, it remains vital that the reality covered by AI is properly understood. So it is important to define a framework that ensures it truly serves the interests of those who need to develop their skills and the companies that employ them.

This is the focus of these reflections: taking stock of what exists today and drawing up possible paths for the future, near or distant. Here we are looking to define the ethical framework that finds the right balance between promises of a better world (more personalisation, greater effectiveness, reduction in repetitive tasks, etc.) and the many fears that artificial intelligence causes (upheaval in the trainer's role, control of data and so on).

## What exactly is artificial intelligence?

AI means a computer program that can simulate human faculties (such as facial and image recognition, sound, automatic translation, etc), manage man-machine dialogue (questions and answers) or simply process huge amounts of data to guide decision-making.

### There are two types of artificial intelligence:

- **Weak AI** (or narrow AI) performs simple, repetitive tasks, but can also evolve within a limited scope. It is incapable of tackling a problem in its entirety or understanding its context. It is mostly about reproducing human actions faithfully by using automation or a program to improve reliability.
- **Strong AI** (or general AI) is able to reflect, understand a context and develop its own reasoning. This is the notion of machine consciousness.

AI already exists in our everyday lives in the form of chatbots, robots, connected objects, smart speakers, smart assistants, driving applications, invisible applications, social media algorithms and much more. This is usually weak, rather than strong, AI. In Learning & Development, we are still at the stage of weak AI applications.

## The combination of AI and skills development is now with us ... more or less

There have been many studies and predictions about AI's impact on jobs and sectors of work.

In 2018, Gartner suggested that as much as a third of the world's jobs would be replaced by algorithms and AI technology by 2025.

Also in 2018, McKinsey projected that by 2055, the working world as we know it would be shaken up, with automated work processes affecting 60% of jobs worldwide. In 2019, the OECD predicted that over the next 20 years 14% of jobs would disappear and 32% of them would be changed profoundly.

So all stakeholders in L&D are strongly encouraged to fight the obsolescence of skills and therefore tackle the AI turn today.



A study in March 2019 from edtech start-up, HolonIQ, involved 400 decision-makers in education and training highlighted a growing, yet still disparate, use of AI:

10% of firms have already invested in AI and introduced it in certain areas of their operations.

20% are currently conducting pilot projects.

30% have AI in their sights but no special plan on how to adopt it.

Most other firms plan on using artificial intelligence as a short-term or medium-term project.

Only 5% said they were not at all interested in adopting AI.

Just as the 2000s saw the internet expand, the 2020s could see the growth of an accessible form of AI that helps develop skills.

## Three ways in which AI can be used to help skills development

In their work *Artificial Intelligence In Education: Promises and Implications for Teaching and Learning*, Wayne Holmes, Maya Bialik and Charles Fadel put forward a classification that singles out three uses of AI applied to skills development:

1. **Using AI to constantly adapt a business activity or training course:** AI uses data and analyses to continuously adjust the user's training course.
2. **Using AI to improve the learning environment:** like a virtual concierge, AI guides learners towards the right people and provides support for all non-formative tasks.
3. **Using AI to transform the learning experience and the trainer's profession:** AI becomes an assistant for the trainer or designer. It gives them special recommendations for each learner or group and relieves them of tasks that have no added value for training.

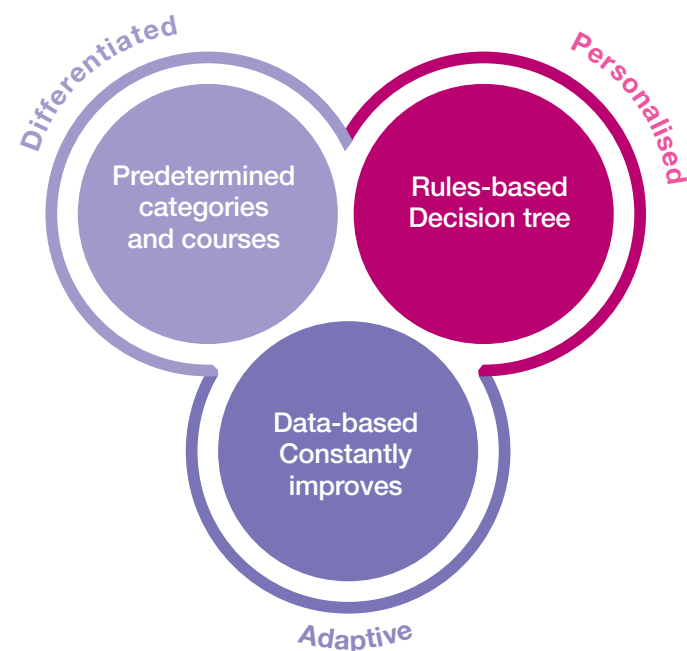
AI is therefore a great innovation-accelerator for learning. Its purpose is twofold: to help learners train more effectively and to help trainers improve their support.



# Using AI to continuously adapt a training course or a learning path

**In this scope of application, AI uses data and analyses to continuously adapt the learner's training course or path.**

AI itself improves over time based on the data it collects: it learns content in a systematic, structured, explicit way, going from a simple level to a complex level.



There are three levels for individualised learning systems. The first two are not based on AI, the third one is.

**1. Differentiated learning:** several courses are offered to learners through a platform. They are usually organised into predefined categories. It is the learner who chooses the course that suits them best, without any automatic guidance.

**2. Personalised learning:** a different course for each learner is put forward using a rules-based method. For example, the learner can take a preliminary assessment and, depending on their choices, the system offers a specific course and particular content. This technology combines each learner's profile with resources to suit them. Research shows this personalised approach improves learning results. The system assumes that each learner is totally unique. It serves as a guide, drawing up the path to follow.

**3. Adaptive learning:** this develops personalised learning even further by using data and analyses to continuously adapt and improve the user's training course.

Such complex adaptability can be found today in specialist, research-based programmes like DreamBox Math and Carnegie Math Pathways. Programme structure and material are put forward in accordance with analysis of each user's specific style of learning along with a complex, iterative analysis of the learner's grasp of a mathematical concept.

Several tools, including Woonoz, Gutenberg Technology, Domoscio, Didask and Axonify, also incorporate the principles of adaptive learning, either partially or fully.



## The #UP skills acquisition collection by Cegos

The #UP Collection from Cegos helps users train themselves in soft skills with practical applications in real work situations, and combines the benefits of online learning with human tutoring and guidance.

#UP provides in particular an individualised approach, which guides the learner towards the most appropriate learning 'sprints', taking into account the application of their skills.



DISCOVER OUR #UP COLLECTION



### The two minimum requirements for introducing adaptive learning

To use the most advanced application of AI in adapting a training course:

**1 - Content should first be structured and granulated into independent points of learning**, then associated with knowledge or skills, and lastly classed using metadata.

**2 - It should be based on data** covering a learner's preferred way of learning and their ability to grasp of concepts.



# Using AI to improve the learning environment: the emergence of learning companions

AI applied to learning environments can already be seen in the rise of learning companions, helping to play a key role in creating richer learning environments.

## AI as a virtual concierge

Acting like the learner's personal assistant, AI forms part of a broader environment of resources and players.

Like a virtual concierge, it can provide support for all non-formative tasks such as registering for relevant training courses, publishing certificates and so on.

What really makes learning companions smart is their ability to offer the right content and promote human intervention at the right pace and at the right time for effective learning.

With machine learning (programs that teach machines to learn by themselves), AI assistants will soon be able to find the most likely problem situations among users so it can anticipate them.

According to Charles-Edouard Bouée and François Roche, the authors of *La Chute de l'Empire Humain, Mémoires d'un robot* (*The Fall of the Human Empire: Memoirs of a Robot*) (Grasset, 2017), a botnet (convergence of robots and the internet) will have emerged by 2026. It could answer our questions without us having to search the web, and sometimes even without us having to ask the question!



## The five aims of learning companions

- 1. Curating and analysing opportunities for assignments or jobs in accordance with personal preferences, today and tomorrow.**  
This aims to find assignments, projects or firms that help an individual rise to new professional challenges and gain knowledge.
- 2. Curating suitable content:** finding the right learning resources in different ecosystems (open/public, structured/non-structured data, etc.).
- 3. Tracking proofs of new skills acquired over time,** with publication of micro-accreditations approved via blockchain.
- 4. Finding the right learning partners** (colleagues, experts, peers, etc.) and thereby playing the role of learning network orchestrator (LNO).
- 5. Providing support and feedback via interactive features** (natural language processing, video analysis, chatbots, etc.) to track progress, stimulate the learner and make sure they stay on track.

## Learning Companions: dream or reality?

All this might seem like science fiction. Yet the different technological building blocks of learning companions already exist:

- **Smart speakers** (Alexa, Google Home, etc.) with voice interaction and web-based curation.
- **Applications** like Orai that help develop our public-speaking skills, or those like Edzo, which offers personalised tracking and interactions with experts or peers to make progress.
- **Adaptive learning** (Knewton, Area9, etc.), which personalises the learning experience.
- **Automated assessment of personalities and skills**, like Cristal or Matchedu. These applications help interaction with others according to personality traits: our own and those of people we interact with.
- **Automated recruitment** and coordination of job opportunities (Lymia, Mya, Tengai, Zara, etc.) with profile analysis, automated interviews, behavioural analysis, etc.
- **Smart curation tools** like Edcast or Filtered that pick out the most relevant content for each person.
- **Suppliers of entry passes**, like Mozilla or BCDiploma, combined with blockchain technology. These offer a safe model for collecting and sharing indicators of skills and accreditations. They cover, for example, academic qualifications, entry passes, certificates and reference letters.



## Introducing Albert, the first Cegos digital tutor

Developed by the Cegos Group's innovation team, Albert helps people meet operational challenges in real-life work situations.

For example, with Albert, learners can successfully get their next public presentation ready, the idea being to learn through practice. Albert uses the individual's own situation as a starting point, asks questions and gives key advice to help them reach their goal.

Currently a prototype, in French language, Albert features weak artificial intelligence. The aim is for Albert to learn from its interactions with each person to become smarter.



DISCOVER  
AND TEST ALBERT!  
*(French content)*

For Cegos, tomorrow's learning companion is at once a coach, mentor and tutor.

It knows our preferences by picking them up on social media. It asks questions, builds bridges and offers learning content that is reliable. It provides positive or constructive feedback to keep learners motivated in the long term.





# Using AI to transform the learning experience and the trainer's profession

Today, data from training courses helps us understand individual learning pathways. It allows us to place each learner in an environment that suits them so they can develop and make progress.

In the future, this and other data will help supply strong AI with the data it needs to grasp contexts and develop its own reasoning. This form of AI will feature at each stage of the learning process and considerably change the trainer's profession.

## Continuously improving learning courses

The abundance of data collected on platforms already supplies some trainers with precious information. They are increasingly playing the role of e-coach, supporting learning over time, for example, talking about what has been learned and strengthening points of learning.

In the near future, AI is set to help trainers understand learners in even greater detail, making it easier to identify actions or phases with added value as well as those key moments where the learner may risk dropping out of the course as they progress through their learning activities.

Let us imagine an assistant we can call AITA (Artificial Intelligence Teaching Assistant) and that this assistant can carry out the following six tasks:

- 1. Tracking a learner's progress in detail as their learning and teaching process progresses.** With assessments taking place continuously, who needs examinations?
- 2. Adjusting learning conditions according to different times of day, based on chronobiology.** By detecting some of the learner's vital signs, AITA could alert trainers, suggesting changes of pace if the learner becomes less vigilant or more tired.
- 3. Creating the most suitable groups of learners and trainers.** Based on detailed knowledge of each person's profile, characteristics and learning preferences.
- 4. Suggesting the learning method best suited to the subject concerned and to individual motives.** AITA could help those in need of extra support by offering mentoring, for example, or by developing and providing catch-up courses.
- 5. Relieving trainers of repetitive tasks.** Thereby helping them focus on supporting learners and carrying out more complex tasks.
- 6. Keeping personal records up to date and correct.**



## Does AI herald the end of trainers?

At Cegos, we are convinced that the more technology improves, the more decisive human interaction becomes: technology forms a tool for humans, humans do not form a tool for technology.

So, we should debunk the myth that AI will simply replace trainers. Instead of rivalry, there is real symbiosis between humans and machines, as these two examples show:

In their article *A.I. Is the New Teaching Assistant in the Classroom*, Rose Luckin and Wayne Holmes describe a situation where teachers, pupils and parents live and work together alongside smart machines.



Rose Luckin, Wayne Holmes :  
*A.I. Is the New Teaching Assistant in the Classroom*

Chess grandmaster Garry Kasparov has observed that the best teams in chess today are neither human nor robotic, but a mix of humans and robots. What really makes the difference is the combination of their skills!



Garry Kasparov :  
*Don't fear Intelligent Machines. Work with Them*

## Designing and developing better courses

For several years, firms have tried to meet the considerable challenge of streamlining and developing training courses. According to the HCM Technology Study from Brandon Hall Group, 18% of all training companies worldwide have started automating the development of training courses.

AI is especially valuable in three areas:

- **Needs analysis:** AI helps understand needs in skills development, for example, by textual analysis of specifications.
- **Content optimisation:** AI helps pick out appropriate training content spread out over different learning resources and select the most effective version.
- **Teaching methodology:** AI can, for example, pick out content from an expert and turn it into a teaching resource without human intervention.



# Establishing an ethical framework for AI in learning: catastrophic scenarios and antidotes

Algorithms do not have any moral boundaries or ethical principles. It is up to the humans who design these algorithms to foresee and regulate their effects by establishing principles and defining a framework that will protect learners' interests.

At Cegos, we have chosen an empirical approach, identifying three major risks from AI in learning and putting forward principles to help manage these risks.



## Three major risks of AI in learning and how to manage them

### 1. AI in learning and the risk of exclusion

#### CATASTROPHIC SCENARIOS

This is where an AI program locks you out of a given field or framework:

- Because it attempts to meet your learning preferences, the AI program only identifies **you as a learner in certain subjects and not in any others.**
- Because you do not have the required level or your physiological or emotional state is not compatible with a certain training course, **the AI program prevents you from accessing to it.**

To avoid this, we apply:

#### The principle of accessibility to courses:

any individual should be able to enjoy access to any content that is in the hands of AI, unless this puts a human being in danger.

#### The principle of human supervision of all use of AI:

the learner should be able to enjoy human contact to get information about their training course.



## Preventing and limiting the dangers of AI in general



In the report *The Malicious Use of Artificial Intelligence: Forecasting, Prevention, and Mitigation*, published in February 2018, you can read the recommendations from 26 AI specialists to prevent or limit the main dangers of AI.

## 2. AI in learning and the risk of opacity

#### CATASTROPHIC SCENARIO 1

All trainers are replaced by AI tutors. These tutors end up being driven purely by production, without any personal charm or desire to help the learner make progress.

To avoid this, we apply the principle of transparency: we commit to indicating whether the tutor is an AI program or a human being.

#### CATASTROPHIC SCENARIO 2

The learner achieves a score that is not high enough in an important exam but does not understand where they made mistakes or why they were not selected.

To avoid this, we apply the principle of algorithm explanations: the learner should be able to understand the score they achieved (for example, how it was reached) and the mechanisms that govern any decision about them.

#### CATASTROPHIC SCENARIO 3

The content-curation system shares items of fake news generated by AI programs designed to make this news as believable as possible.

To avoid this, we apply the principle of data authenticity: In content-curation, the learner should know how the algorithm sourced its content and whether the content has been approved by an expert (with the possibility of contacting the expert).

## 3. AI in learning and the risk of uncontrolled data-sharing

#### CATASTROPHIC SCENARIO

All your learning data and learning preferences are shared within your firm. Even the smallest failure at the start of your career can follow you throughout your working life.

To avoid this, we apply the principle of user consent in data-collecting. This is about taking into account differentiated learning while protecting confidential personal data:

- Anonymise statistical data
- Give users the right to withdraw and the opportunity to renegotiate their aim or discuss with a human
- Give users the right to delete data





# Cegos solutions to turn skills into performance

**To help firms introduce global training programmes, Cegos provides them with a wide range of multilingual digital resources available in a variety of interactive formats.**

**Anonymised data collected can be used to measure the effectiveness of programmes, improve our solutions and oversee performance in the long term.**

## Our Digital Catalogue

**Cegos offers over 2,100 pieces of multilingual content, compatible with mobile devices and available in interactive formats. With engaging content, learners can experiment with others and apply their skills to real work situations.**

Learning areas include: Management and Leadership, Sales and Customer Relations, Professional and Personal Efficiency, Project Management, Personal Development and Human Resources.

**A unique approach:**



**With the 4REAL® (Real Efficient Adapted Learning) approach, learners are given an experience that encourages real application of what they have learned:**

- Blended programmes feature application of skills to work situations throughout the learner's course.
- The best digital technology, accessible at all times.
- Made-to-measure, customisable solutions can be tailored to each participant's pace and to each firm's priorities.

## The #UP Collection

**Digital programmes allowing each participant to acquire and apply cross-disciplinary soft skills.**

Learners progress at their own pace, guided by a tutor, coach or manager, and through experience-sharing with their peers to apply their knowledge and improve their performance.

## Sprints

**Interactive one-hour digital pathways, combining a variety of ready-to-use modules.**

Each Sprint focuses on operational expertise to provide visible results. Sprints are easily incorporated into the #UP programmes or 4REAL® courses.

## A new L&D experience:

### LearningHub @Cegos

**An online platform available on all devices providing access to all training courses, this immerses the user in the Cegos learning experience.**

- Learners can find their training course, history, discussion space and tasks to carry out on their personalised account.
- Trainers can lead courses independently, in classrooms or remotely, and track each learner's progress.
- Businesses can view performance indicators to track the progress of their learning organisation in real time.

LearningHub@Cegos already has over 310,000 users worldwide.



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