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Artificial Intelligence - Curriculum for Adult Education

Toolkit for capacity building in AI beginner courses

ARTIFICIAL INTELLIGENCE (AI): PERCEPTIONS – PHILOSOPHY OF TECHNOLOGY AND AI

Keywords	• Artificial Intelligence • Clerical jobs substitution • Convolutional Neural Networks (CNN) • Digital Assistant • Digital maps • GPS Navigation • Graph Neural Networks (GNN) • Lethal Autonomous Weapons (LAW) • Unemployment
Time (How long?)	1.5 hours
Target group (Who?)	• Trainers in adult education, who implement learning activities in the field of AI. • Adult learners, who want to understand how AI works and how AI can be applied in everyday life, and learners who want to train their skills in using technological tools.

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Learning outcomes (What?)	• The activity leads to adaptation of a critical point of view of technology, a critical point of view specifically on artificial intelligence. Technology has become an essential part of our life and artificial intelligence is meant to be a revolution in our modern world. • Learners will understand why artificial intelligence is another step in the evolution of our societies, furthermore, they will analyse the advantages and disadvantages of artificial intelligence.
Learning outcomes (Why?)	Do you perceive AI as an opportunity or a thread? In this unit you will find arguments for both, pros and cons of AI. It is especially important that you reflect on your own attitude towards AI, and at the same time remain open for new insights. Since AI is already a part of our lives, better understanding of it enables us to perceive AI in a more holistic way.
Methodology (How?)	The learning unit can be used both in self-study individually and in small groups collectively. The learning unit follows the "learning-by-doing" approach and aims to ensure learning success through the application of practical experience reports and interactive impulses. The learning unit is divided into six components: • Test yourself! • Activity description • Case studies

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	- Lesson learnt - Evaluation - Related resources In addition, trainers will also find further information (i.e. time estimated and equipment needed) to conduct the session independently.
Equipment	Whiteboard (or digital alternative like Jamboard), sheets, pens, colours, internet access as well as all learning materials printed or digital (esp. for the sections of Test yourself, Case studies, and the evaluation sheets).
Learner motivation	Please think about why you are attending this unit. Make a note of your personal motivation for learning and keep it in mind as you work through the unit. At the end of the unit, remind yourself of your initial motivation.

Implementation/learning-unit

Test yourself!	Before the learning unit starts, we ask you to test yourself! Below you will find 5 questions on the topic of AI & education.

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Please answer the questions by evaluating your current state of knowledge, capacity, and motivation. The full score of each question would be 10 points, which means you agree with the statement 100 percent. The lowest score would be 0 point, which means you do not agree with this statement at all. Feel free to choose a score that reflects your own state of mind the best.

1. I am familiar with the pros and cons of AI.
2. I believe AI has already brought many important changes to our lives.
3. I can explain general points of Heidegger's theory about technology to a friend.
4. I would like to understand whether AI is truly a "highest danger" as Heidegger claims or is it actually an opportunity.
5. I would like to do more research on my own to find the benefits and the downsides that AI brings.

Please summarise your points for the 5 questions.
What is your score?
Are you ready to start the lesson?

Activity description	1. Introduction to the activity.
	2. Watch the video or read the article: https://www.futurelearn.com/info/courses/philosophy-of-technology/0/steps/26314YouwillhavethechoiceeitherwatchingthevideoorreadingthearticIe

3. Form two groups. Discuss in your group how you understood the video / article. Try to briefly summarise Heidegger's thoughts by considering the following three points of his theory:

- Technology is not an instrument.
- Technology is not a product of human activity.
- Technology is the "highest danger".

4. 'Artificial Intelligence is the ability of a computer programme to learn and think. Everything can be considered Artificial intelligence if it involves a programme doing something that we would normally think would rely on the intelligence of a human.' Present to the other group how you understood Heidegger's theory.

5. One group decides to present the advantages of AI, the other group considers disadvantages of AI. At the end, the groups should present the advantages and disadvantages to each other. To support your arguments, each group will have access to two case studies (see below) of what AI can bring. Plus, some clues aboutadvantages and disadvantages will be given without the argumentation behind (see below).

6. Please discuss in the end and form a common perception on the question: What can AI bring to our society?

Case studies

Case 1 – Using AI to enrich digital maps

Model tags road features based on satellite images, to improve GPS navigation in places with limited map data.

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In training, RoadTagger learns weights — which assign varying degrees of importance to features and node connections — of the CNN and GNN. The CNN extracts features from pixel patterns of tiles and the GNN propagates the learned features along the graph. From randomly selected subgraphs of the road, the system learns to predict the road features at each tile. In doing so, it automatically learns which image features are useful and how to propagate those features along the graph. For instance, if a target tile has unclear lane markings, but its neighbour tile has four lanes with clear lane markings and shares the same road width, then the target tile is likely to also have four lanes. In this case, the model automatically learns that the road width is a useful image feature, so if two adjacent tiles share the same road width, they're likely to have the same lane count.

Case 2 – The U.S. alarmingly close to an autonomous weapons arms race

We may enter a period of escalation that recalls the nuclear arms race between the U.S. and the former Soviet Union during the Cold War.

"There's an AI arms race where I'm worried about your development of this technology and you're worried about my development of this technology,and neither ofus communicates that we're aware of the limitations," said Chris Meserole, director of research and policy for the Artificial Intelligence and Emerging Technology Initiative at the Brookings Institution.

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	He spoke during a Defence One/Nextgov panel discussion on AI ethics and policy. **Advantages of the AI** • Digital Assistance • Available 24/24 7/7 • Takes risks instead of Humans • Helping in Repetitive Jobs • Faster Decisions **Disadvantages of the AI** • High Costs of Creation • Making Humans Lazy • Unemployment • No Emotions • Lacking Out of Box Thinking
Lessons learnt	AI's integration into business and technology systems can bring numerous benefits and opportunities to societies and economies. With the support of AI, we have more possibilities to improve the process of decision making, to increase efficiency, and to reduce errors made by human beings. The technologies of AI are able to make the workplace safer by replacing humans conducting risky tasks in a hazardous condition. And, as we have seen in other lesson units, AI can support scientists to make considerable advancement in the area of healthcare. Ultimately, AI has the potential to significantly improve all aspects of human life.
Follow up	
Evaluation	Evaluation for learners: • Do the activity Test yourself! again. Have you improved?

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5. I would like to do more research on my own to find the benefits and the downsides that AI brings.

As last time, choose a score between 0 - 10 for each question. 10 points, when you agree with the statement 100 percent, or 0 point, when you do not agree with this statement at all.

What is your score now? Has your score changed? Which question has the biggest change of score? And which aspect of AI would you like to know more about?

- Take some time to reflect on the learning unit. Ask yourself:

What three aspects did you learn? Which three things do you still have questions about or want to know more about?

Compared to the motivation you had at the beginning of the session, has the learning unit fulfilled your motivation? Did you expect something different?

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Is there anything missing from the unit? What are your next steps?

You can discuss these questions alone, in a group or with a trainer.
You are invited to read more about the fundamentals about AI in these briefings (link of basic briefings) and the impact of AI in other fields in these briefings (link of further briefings). And you are encouraged to extend your knowledge by using our learning platform (Link).

Evaluation for trainers:

Please evaluate the training material from a trainer's point of view.

- Is the learning unit well designed and explained so that it can be easily transferred into the training context?

o Absolutely agree
o Agree
o Disagree
o Totally disagree

- Did the learning unit trigger discussions within the group?
o Absolutely agree
o Agree
o Disagree
o Totally disagree

- Also, think about how you can develop your training based on this session and the feedback from learners. Take notes on this.

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Related resources 📖	• Articles https://www.futurelearn.com/info/courses/philosophy-of-technology/0/steps/26314 https://news.mit.edu/2020/artificial-intelligence-digital-maps-0123 https://www.fastcompany.com/90640573/autonomous-weapons-war https://towardsdatascience.com/advantages-and-disadvantages-of-artificial-intelligence-182a5ef6588c?gi=6f375c532d69

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ARTIFICIAL INTELLIGENCE (AI) AND THE IMPROVEMENT OF EDUCATION

Keywords	• Artificial Intelligence • Algorithms • Cognitive bias • Compas / ML crime reiteration estimation • Digital (Data, Algorithms & Platform) Ethics • Gender / race discrimination • Privacy protection • User profiling
Time (How long?)	1.5 hours
Target group (Who?)	• Trainers in professional further education, who implement learning activities in the field of AI. • Adult learners, who want to understand how AI works and want to train their skills in using technological tools.
Learning outcomes (What?)	This activity allows you to guide learners to understand the impact of ethics in AI. The activity allows the learners to improve the following:

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	- The activity allows trainers to guide learners to think critically about important ethical issues implied in the use of AI in socially relevant activities, such as human resources selection process. These issues relate to matters like discrimination, sexism, racism and more generally to BIAS of the algorithms. - The activity allows learners to become familiar with the understanding of the topic of how biases might be reflected in technology through Real-Life Examples of AI BIAS improving reading and writing skills.
Learning outcomes (Why?) **?**	Ethics and AI should work hand in hand, unfortunately, this is not always the case. Inevitably, AI makes biased decisions based on biased data, wrong algorithm or misinterpretation. This can lead to some ethical concerns, that have serious consequences for various groups of people. Can you imagine applying for a job but not being chosen because of biased decision AI has made while choosing the candidates? This shows how important it is to reconsider the actions of AI, as well as focusing on making AI ethical. These concerns will be discussed in the following unit.

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Methodology (How?)	The learning unit can be used both in self-study individually and in small groups collectively. The learning unit follows the "learning-by-doing" approach and aims to ensure learning success through the application of practical experience reports and interactive impulses. The learning unit is divided into six components: • Test yourself! • Activity description • Case studies • Lessons learnt • Evaluation • Related resources In addition, trainers will also find further information (i.e. time estimated and equipment needed) to conduct the session independently.
Equipment	Whiteboard (or digital alternative like Jamboard), sheets, pens, colours, internet access as well as all learning materials printed or digital (esp. for the sections of Test yourself, Case studies, and the evaluation sheets).
Learner motivation	Please think about why you are attending this unit. Make a note of your personal motivation for learning and keep it in mind as you work through the unit. At the end of the unit, remind yourself of your initial motivation. unit? What are your next steps?

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Implementation/learning-unit

Test yourself!

Before the learning unit starts, we ask you to test yourself! Below you will find 5 questions on the topic of AI & ethics.

Please answer the questions by evaluating your current state of knowledge, capacity, and motivation. The full score of each question would be 10 points, which means you agree with the statement 100 percent. The lowest score would be 0 point, which means you do not agree with this statement at all. Feel free to choose a score that reflects your own state of mind the best.

1. I am aware that AI does not always make the right decision.
2. I believe ethics is an important aspect when developing and implementing AI.
3. I can explain what BIAS means to a friend.
4. I would like to know more about how AI can help people to be more ethical.
5. I would like to promote a more ethical approach of AI by telling others the possible biases of AI.

Please summarise your points for the 5 questions.
What is your score?
Are you ready to start the lesson?

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Activity description	1. Introduction of the activity. 2. Collective brainstorming on the concept of BIAS: what does the word BIAS mean? Can you provide a sample of BIAS, for instance a witnessed situation or reported by the newspaper? (Use sticky notes on the Whiteboard or in the Jamboard). 3. Come to a shared definition of BIAS, write the definition on the Whiteboard. Validate it through internet research. 4. Form 3 small groups. Each group reads one case study. Discuss the following questions within your group: What is in your case study the BIAS? How is the BIAS in your case study generated? What could have been done to avoid the BIAS? 5. Based on your comments on your case study, write down 5 useful recommendations for Ethic in AI. You can also use the internet for further research. 6. Present your case and your recommendations to the other groups. 7. Reflect about the impact of Ethics in AI. Consider the question: How can BIAS be avoided?
Case studies	**Case 1 – Amazon** In 2018, Reuters reported that Amazon had been working on an AI recruiting system designed to streamline the recruitment process by reading resumes and selecting the best-qualified candidate.

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Unfortunately, the AI seemed to have a serious problem with women, and it emerged that the algorithm had been programmed to replicate existing hiring practices, meaning it also replicated their biases.

The AI picked up on uses of "women's" such as "women's chess club captain" and marked the resumes down on the scoring system. Reuters learned that "In effect, Amazon's system taught itself that male candidates were preferable." Rather than helping to iron out the biases present in the recruitment process, the algorithm simply automated them. Amazon confirmed that they had scrapped the system, which was developed by a team at their Edinburgh office in 2014. None of the engineers who developed the algorithm wanted to be identified as having worked on it.

Case 2 – Racist healthcare

Last year a team from University of California Berkeley discovered a problem with an AI that was being used to allocate care to 200 million patients in the US, which resulted in black patients receiving a lower standard of care. Across the board, black people were assigned lower risk scores than white people, despite the fact that the black patients were also statistically more likely to have comorbid conditions and thus in fact experience higher levels of risk. This in turn meant that black patients were less likely to be able to access the necessary standard of care, and more likely to experience adverse affects as a result of having been denied the proper care.

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The problem stemmed from the fact that the system was allocating risk values using the predicted cost of healthcare as the determining variable, and because black patients were often less able to pay or were perceived as less able to pay for the higher standard of care, the AI essentially learned that they were not entitled to such a standard. Having made this discovery, the UC Berkeley team worked with the company responsible for developing the tool to find variables other than cost through which to assign the expected risk scores, reducing bias by 84%.

Case 3 – Compas

COMPAS (which stands for Correctional Offender Management Profiling for Alternative Sanctions) is an algorithm used in state court systems throughout the United States. It is used to predict the likeliness of a criminal reoffending; acting as a guide when criminals are being sentenced. Propublica analysed the COMPAS software and concluded that "it is no better than random, untrained people on the internet" . Equivant - the company who developed the software - disputes the programme's bias. However, the statistical results the algorithm generates predict that black defendants pose a higher risk of reoffending than a true representation, while suggesting that white defendants are less likely to reoffend. Black defendants were almost twice as likely to be misclassified with a higher risk of reoffending (45%) in comparison to their white counterparts (23%).

Lessons learnt

Bias has always been a part of AI, as well as a part of our cognitive perception as a human being. As you have seen in this lesson, despite of the numerous benefits brought by AI, ethical issues are a concern brought by the prolific use of AI across our economies and societies, and we must take them into consideration during the implementation of AI.

After this session, we hope you have seen the potential problems AI can bring, particularly in the field of privacy and data protection, and have now an understanding that many of these problems come from the lack of transparency during the implementation of AI tools. There is still a long way to go to ensure a neutral process of decision making, decisions that are not susceptible to human biases or data inaccuracies.

The good news is, governments and regulators in many states are taking actions towards this direction. The European Union has already established its Artificial Intelligence Act to address these issues in the specific direction. If you are interested in this exciting development, we encourage to take a look at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52021PC0206&from=EN

Only when we are aware of this issue, the technology of AI can develop ethically and responsibly, so that it can bring equal distribution of improvement and opportunities to all people.

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Follow up

Evaluation	Evaluation for learners:
	 • Do the activity Test yourself! again. Have you improved? 1. I am aware that AI does not always make the right decision. 2. I believe ethics is an important aspect when developing and implementing AI. 3. I can explain what BIAS means to a friend. 4. I would like to know more about how AI can help people to be more ethical. 5. I would like to promote a more ethical approach of AI by telling others the possible biases of AI. As last time, choose a score between 0 - 10 for each question. 10 points, when you agree with the statement 100 percent, or 0 point, when you do not agree with this statement at all. What is your score now? Has your score changed? Which question has the biggest change of score? And which aspect of AI would you like to know more about? • Take some time to reflect on the learning unit. Ask yourself: What three aspects did you learn? Which three things do you still have questions about or want to know more about?

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Compared to the motivation you had at the beginning of the session, has the learning unit fulfilled your motivation? Did you expect something different?

Is there anything missing from the unit? What are your next steps?

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Evaluation for trainers:

Please evaluate the training material from a trainer's point of view.

- Is the learning unit well designed and explained so that it can be easily transferred into the training context?

o Absolutely agree
o Agree
o Disagree
o Totally disagree

- Did the learning unit trigger discussions within the group?

o Absolutely agree
o Agree

	o Disagree o Totally disagree • Also, think about how you can develop your training based on this session and the feedback from learners. Take notes on this.
Related resources 📖	Articles https://www.telusinternational.com/articles/7-types-of-data-bias-in-machine-learning?INTCMP=ti_lbai https://www.logically.ai/articles/5-examples-of-biased-ai

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ARTIFICIAL INTELLIGENCE (AI) IN HUMAN-MACHINE INTERACTION

with Google Assistant

Keywords	• Artificial Intelligence • Human Machine Interaction • Virtual assistant • Smart devices
Time (How long?)	1 hour
Target group (Who?)	• Trainers in professional further education, who implement learning activities in the field of AI. • Adult learners, who want to understand how AI works and can be applied and who want to train their skills in using technological tools.
Learning outcomes (What?)	This learning unit allows you to guide learners to empirically understand one type of basic human-machine interaction and why humans keep searching ways to improve it.

Learning outcomes (Why?)	Many people are afraid about AI. They are worried about losing their jobs, as robots seem to be able to replace human beings in the near future. In reality, human machine interaction is a more likely result of incorporating AI technology in the workplace. Although this might seem distant, we are already interacting with machines almost on a daily basis. In which way? Find out in this unit!
Methodology (How?)	The learning unit can be used both in self-study individually and in small groups collectively. The learning unit follows the "learning-by-doing" approach and aims to ensure learning success through the application of practical experience reports and interactive impulses. The learning unit is divided into five components: • Test yourself! • Activity description • Lessons learnt • Evaluation • Related resources In addition, trainers will also find further information (i.e. time estimated and equipment needed) to conduct the session independently.
Equipment	Whiteboard (or digital alternative like Jamboard), sheets, pens, colours, internet access as well as all learning materials printed or digital (esp. for the sections of Test yourself, Case studies, and the evaluation sheets).

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Learner motivation	Please think about why you are attending this unit. Make a note of your personal motivation for learning and keep it in mind as you work through the unit. At the end of the unit, remind yourself of your initial motivation.

Implementation/learning-unit

Test yourself!	Before the learning unit starts, we ask you to test yourself! Below you will find 5 questions on the topic of AI & education. Please answer the questions by evaluating your current state of knowledge, capacity, and motivation. The full score of each question would be 10 points, which means you agree with the statement 100 percent. The lowest score would be 0 point, which means you do not agree with this statement at all. Feel free to choose a score that reflects your own state of mind the best. 1. I am familiar with how machine learning works. 2. I believe machine learning can be fun. 3. I can explain the difference between machine learning and classic programming to a friend. 4. I would like to try out different applications powered by AI. 5. I would like to promote fun AI applications that use machine learning to other people.

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	Please summarise your points for the 5 questions. What is your score? Are you ready to start the lesson?
Activity description	Information about Google Assistant: Google Assistant is an artificial intelligence–powered virtual assistant developed by Google that is primarily available on mobile and smart home devices. Users primarily interact with the Google Assistant through natural voice, though keyboard input is also supported. In the same nature and manner as Google Now, the Assistant can search the Internet, schedule events and alarms, adjust hardware settings on the user's device, and show information from the user's Google account. Google has also announced that the Assistant will be able to identify objects and gather visual information through the device's camera, and support purchasing products and sending money. How to use Google Assistant? It can be used on Android device as well as iPhone/iPad. The technical requirements are: For Android: Android 5.0+ with at least 1.0GB of available memory or Android 6.0+ with at least 1.5GB of available memory Google app 6.13 or higher

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Google Play services
720p or higher screen resolution
Device's language set to a language listed above

For iPhone or iPad:
iPhone or iPad with iOS 11 or higher
Device's language set to a language listed above
Google Assistant app (not automatically installed on Apple products)

Google assistant is already installed on the compatible Androidproducts. Otherwise, download it on the Google Play Store. For Iphone/Ipad, download it on the Apple Store.

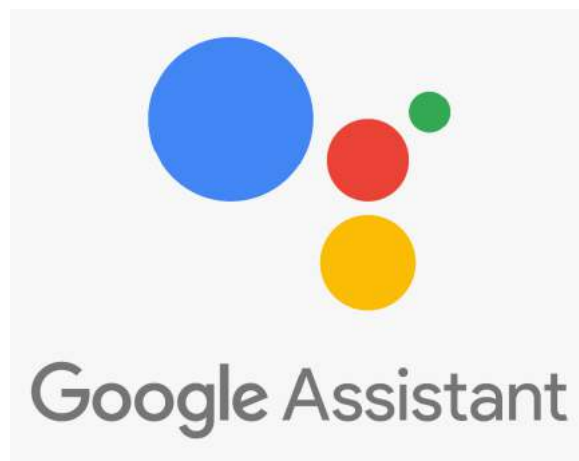Once it is installed, you will see this symbol in your app menu (Fig 1):

Fig. 1

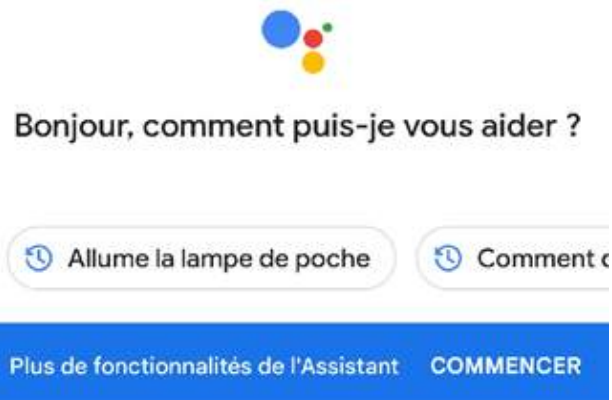Then, you just must select the app, this menu will suddenly appear (Fig 2):

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Fig. 2

Once you are on this step, just talk and ask what you need, as you would do it by taping in the search bar of Google.

⚠ The language of your phone and the language of your google/apple account can be different, both (phone and account) are independent. You can have your phone in Italian while your account is in French. Then, although the phone is in Italian, the google assistant will recognise and work in the French language (like the example above).

Once you are on this step, just talk and ask what you need, as you would do it by taping in the search bar of Google.

Here are the available languages usable by the app: Arabic, Bengali, Chinese (Simplified), Chinese (Traditional), Danish, Dutch, English, French, German, Gujarati, Hindi, Indonesian, Italian, Japanese, Kannada, Korean, Malayalam, Marathi, Norwegian, Polish, Portuguese (Brazil), Portuguese (Portugal), Russian, Spanish, Swedish,

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Tamil, Telugu, Thai, Turkish, Urdu, and Vietnamese.
More languages are planned to be added in the future.

Activity description:

The tool is a typical example of what is the human-machine interaction.
Free and available on most equipment today, it is accessible to a big number of people.

How to proceed:
1. Introduction to the activity.
2. Each learner explores the software individually.
3. Then, each learner searches through Google Assistant other examples of human-machine interaction.
4. Form small groups. Use the definition above and your individual research results and discuss within your group what is, related to you, the best example you found of human-machine interaction.

'Human–Computer or Human-Machine Interaction (HCI/HMI) refers to the communication and interaction between a human person and a machine or a computer. It aims at creating user-friendly software that people want to use, are able to use and find effective to use.'

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Lessons learnt	With this lesson, we hope you have understood the basics of human interaction and human capabilities. You are now familiar with the concept of human-machine interaction, and the effect of AI in such interaction. You can now understand the basics of the technologies that facilitate human-machine interaction. And, most importantly, you have gained an overview of the benefits, disadvantages, challenges, and implications brought by the introduction of AI technologies in human-machine interaction. With the example of Google Assistant, you are now not only able to use it, but can also understand the capabilities brought by technologies like Google Assistant. We hope you are now curious to know more about other human-machine interaction, and are now ready to try some out!

Follow up

Evaluation	<u>Evaluation for learners:</u> Do the activity Test yourself! again. Have you improved? 1.I am familiar with the term "human machine interaction". 2.I believe human machine interaction can result in better efficiency in the workplace. 3.I can explain why human machine interaction is inevitable in the future to a friend.

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4.I would like to learn more about different ways to interact with machines.

5.I would like to promote human machine interaction to people around me.

As last time, choose a score between 0 - 10 for each question. 10 points, when you agree with the statement 100 percent, or 0 point, when you do not agree with this statement at all.

What is your score now? Has your score changed? Which question has the biggest change of score? And which aspect of AI would you like to know more about?

- Take some time to reflect on the learning unit. Ask yourself:

What three aspects did you learn? Which three things do you still have questions about or want to know more about?

Compared to the motivation you had at the beginning of the session, has the learning unit fulfilled your motivation? Did you expect something different?

Is there anything missing from the unit? What are your next steps?

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o Absolutely agree
o Agree
o Disagree
o Totally disagree

- Did the learning unit trigger discussions within the group?

o Absolutely agree
o Agree
o Disagree
o Totally disagree

Also, think about how you can develop your training based on this session and the feedback from learners. Take notes on this.

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Related resources 📖	Articles: https://assistant.google.com/platforms/phones/ https://consent.yahoo.com/v2/collectConsent?sessionId=3_cc-session_458e5cfd-cabf-4ad3-b05f-e9d354d2fbe6 Downloading app: • For Android devices: https://play.google.com/store/apps/details?id=com.google.android.apps.googleassistant&hl=en&gl=US • For Apple devices: https://apps.apple.com/us/app/google-assistant/id1220976145

ARTIFICIAL INTELLIGENCE (AI) IN MACHINE LEARNING

with the example of Scroobly

Keywords	• Artificial Intelligence • Live motion image recognition • Moving doodle • Graphics Interchange Format (GIF) sequence • Portable Network Graphics (PNG) sequence
Time (How long?)	2 hours
Target group (Who?)	• Trainers in professional further education, who implement learning activities in the field of AI. • Adult learners, who want to understand how AI works, how AI can be applied, and learners who want to train their skills in using machine learning tools (i.e. Scroobly).
Learning outcomes (What?)	This activity allows you to guide learners to empirically understand one type of basic machine learning. The activity allows the learners to improve the following: • Understand basic machine learning

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	• Improve digital skills (making the videos, sharing, etc.) • Improve linguistic skills (storytelling, scripting, etc.)
Learning outcomes (Why?) **?**	Although machine learning and artificial intelligence may seem difficult to understand, learning about it can be fun. In this unit we will play with the help of machine learning. Luckily, you do not need any knowledge about programming to do so. Sounds interesting, right?
Methodology (How?)	The learning unit can be worked on both in self-study and in small groups. The learning unit follows the "learning-by-doing" approach and aims to ensure learning success through the application of practical experience reports and interactive impulses. The learning unit is divided into six main topics: • Test yourself! • Activity description • Case studies • Lessons learnt • Evaluation • Related resources In addition, trainers will also find further information (i.e. time estimated and equipment needed) to conduct the session independently.
Equipment	Mobile device or PC (video camera required).

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Learner motivation	Please think about why you are attending this unit. Make a note of your personal motivation for learning and keep it in mind as you work through the unit. At the end of the unit, remind yourself of your initial motivation.

Implementation/learning-unit

Test yourself!	Before the learning unit starts, we ask you to test yourself! Below you will find 5 questions on the topic of AI & education. Please answer the questions by evaluating your current state of knowledge, capacity, and motivation. The full score of each question would be 10 points, which means you agree with the statement 100 percent. The lowest score would be 0 point, which means you do not agree with this statement at all. Feel free to choose a score that reflects your own state of mind the best. 1. I am familiar with how machine learning works. 2. I believe machine learning can be fun. 3. I can explain the difference between machine learning and classic programming to a friend. 4. I would like to try out different applications powered by AI. 5. I would like to promote fun AI applications that use machine learning to other people.

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|	
	Please summarise your points for the 5 questions. What is your score? Are you ready to start the lesson?
Activity description	**Information about Scroobly:** Powered by TensorFlow.js, Scroobly uses Facemesh and PoseNetmachine learning (ML) models to map your live motion to your doodle. The ML system updates the animation seen on screen as you move. Here's how it works: Machine learning (ML) models map your live motion (gestures only) when you opt-in to use your webcam. The ML system updates the animation seen on screen as you move. With Scroobly, you are using artificial intelligence as a creative tool to become a digital animator, even if you've never written code or taken a design class. Create fun animations in real-time with your camera. A simple way to make doodles come to life - no design expertise or coding required. **How to use Scroobly?** Using Scroobly is very easy. - Open the link: https://www.scroobly.com/ - Make sure your browser allows scroobly.com to access the camera - Click on the button "launch the experiment" (figure 1)
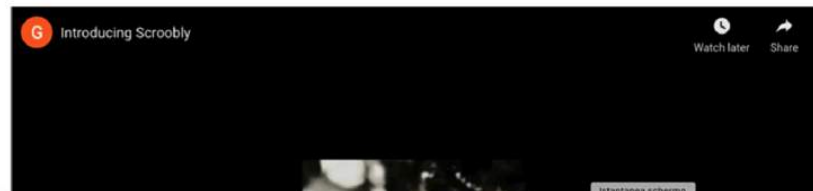
Fig. 1

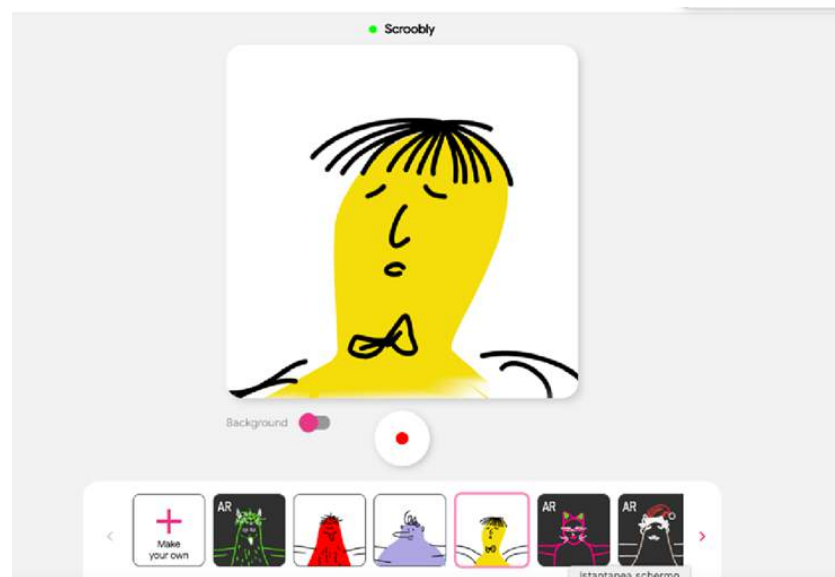- Now you are in front of the Camera
- Choose a body-shape (figure 2)

Fig. 2

- Start to move your body and record the moving doodle. Recording stops after 15 seconds. Now you can download your animation in the following format:

Export GIF / Export PNG sequence = a sequence of images
Export doodle = a file that must be converted online in a video

⚠ Since none of these formats allows you to have a VIDEO, once you have recorded you can play it and record the video with another mobile device, so to have a video with your voice!
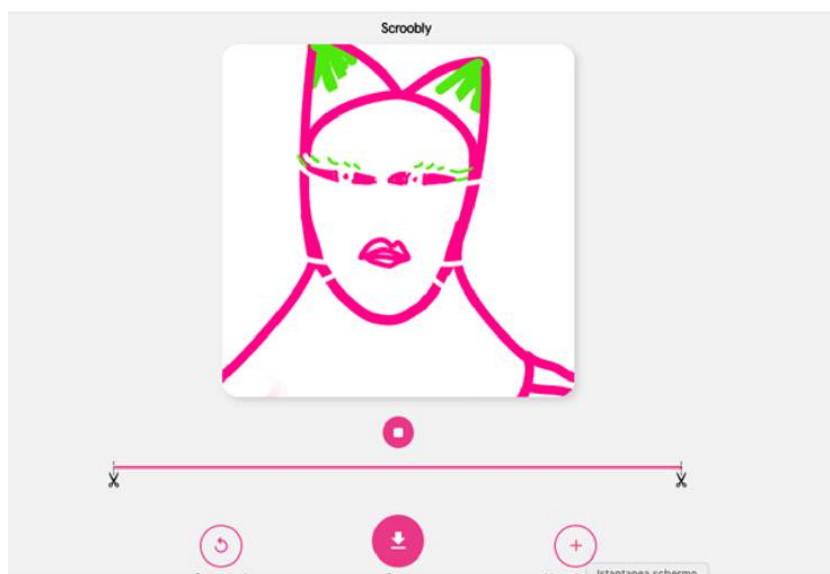
This tool is very versatile and allows a series of different creative activities. Please use the tool Scroobly to engage with the topic of machine learning:

1. Form small groups.
2. Each group experiments the tool and designs an animated story.
3. Each group creates a video based on the animated story.
4. Show your video to the other learners.
5. Please reflect in plenary on how machine learning operates, based on what you have learned about how the tool works.

Please research and present further examples on machine learning.

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Lessons learnt	Machine learning is a branch of AI based on the principle that systems can learn from data and make decisions with minimal human intervention. As you can see in the example of Scroobly, apps powered by machine learning models like TensorFlow, Facemesh or PoseNet, can bring you much fun through the interaction with AI. After this learning unit, we hope you have understood how machine learning operates. Now you have known a few examples of machine learning, we hope you can see the strength and the fun of machine learning, and are curious to explore more possibilities of using machine learning in your everyday life.

Follow up

Evaluation	Evaluation for learners: • Do the activity Test yourself! again. Have you improved? 1. I am familiar with how machine learning works. 2. I believe machine learning can be fun. 3. I can explain the difference between machine learning and classic programming to a friend. 4. I would like to try out different applications powered by AI. 5. I would like to promote fun AI applications that use machine learning to other people.

AIAE

As last time, choose a score between 0 - 10 for each question. 10 points, when you agree with the statement 100 percent, or 0 point, when you do not agree with this statement at all.

What is your score now? Has your score changed? Which question has the biggest change of score? And which aspect of AI would you like to know more about?

- Take some time to reflect on the learning unit. Ask yourself:

1. What three aspects did you learn? Which three things do you still have questions about or want to know more about?
2. Compared to the motivation you had at the beginning of the session, has the learning unit fulfilled your motivation? Did you expect something different?
3. Is there anything missing from the unit? What are your next steps?

You can discuss these questions alone, in a group or with a trainer.

You are invited to read more about the fundamentals about AI in these briefings (link of basic briefings) and the impact of AI in other fields in these briefings (link of further briefings). And you are encouraged to extend your knowledge by using our learning platform (Link).

Evaluation for trainers:

Please evaluate the training material from a trainer's point of view.

	Is the learning unit well designed and explained so that it can be easily transferred into the training context? o Absolutely agree o Agree o Disagree o Totally disagree • Did the learning unit trigger discussions within the group? o Absolutely agree o Agree o Disagree o Totally disagree • Also, think about how you can develop your training based on this session and the feedback from learners. Take notes on this.
Related resources 📖	Articles • https://lionbridge.ai/articles/7-types-of-data-bias-in-machine-learning/

AIAE

ARTIFICIAL INTELLIGENCE (AI) AND SOCIETAL CHALLENGES

Keywords	• Artificial Intelligence • Societal Challenges • Artificial Intelligence & Societal Challenges • Assisted, Augmented, Autonomous Intelligence • Digital Agriculture / Farming • Global diseases tracking • Hate speech
Time (How long?)	2 hours
Target group (Who?)	• Trainers in adult education, who implement learning activities in the field of AI. • Adult learners, who want to understand how AI works and how AI can be applied, and learners who want to train their skills in using technological tools.
Learning outcomes (What?)	This activity allows you to guide learners to empirically understand how AI can be used to address societal challenges (e.g., global hunger or epidemics).

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	The activity allows the learner to improve the following: • Become familiar with the understanding of how AI can tackle societal challenges • Understanding pros and cons of AI used in society
Learning outcomes (Why?) **?**	Societal challenges may seem distant from a specific individual, but sooner or later we can feel the direct or indirect impact on every single one of us. Although some might consider artificial intelligence a threat, this unit presents creative ways of using it as a tool to help society and to protect the environment. The learner can be inspired by these examples, and also can better understand the real-life implications of artificial intelligence.
Methodology (How?)	The learning unit can be used both in self-study individually and in small groups collectively. The learning unit follows the "learning-by-doing" approach and aims to ensure learning success through the application of practical experience reports and interactive impulses. The learning unit is divided into six components: • Test yourself! • Activity description • Case studies • Lessons learnt • Evaluation • Related resources

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	In addition, trainers will also find further information (i.e. time estimated and equipment needed) to conduct the session independently.
Equipment	Whiteboard (or digital alternative like Jamboard), sheets, pens, colours, internet access as well as all learning materials printed or digital (esp. for the sections of Test yourself, Case studies, and the evaluation sheets).
Learner motivation	Please think about why you are attending this unit. Make a note of your personal motivation for learning and keep it in mind as you work through the unit. At the end of the unit, remind yourself of your initial motivation.

Implementation/learning-unit

Test yourself!	Before the learning unit starts, we ask you to test yourself! Below you will find 5 questions on the topic of AI & education. Please answer the questions by evaluating your current state of knowledge, capacity, and motivation.

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The full score of each question would be 10 points, which means you agree with the statement 100 percent. The lowest score would be 0 point, which means you do not agree with this statement at all. Feel free to choose a score that reflects your own state of mind the best.

1. I believe AI can be used in positive ways to improve our everyday life.
2. I can name three examples where AI is used in our society.
3. I can explain the benefits and the potential problems of AI to a friend
4. I am curious to know how AI is used during a global pandemic.
5. If I were a teacher, I would include AI as a topic while discussing societal challenges with my students.

Please summarise your points for the 5 questions.
What is your score?
Are you ready to start the lesson?

Activity description	1. Introduction of the activity. 2. Collective brainstorming on the use of AI for addressing societal challenges: what are some urgent societal challenges? Do you have any idea about how AI is used or can be used to tackle them? 3. Watch these two videos: <u>AI in agriculture</u> and <u>AI in epidemics</u>

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	4.Collective discussions on the video: how is AI used for addressing societal challenges? What are the pros and cons of its application in the fields? 5.Once you defined how AI is used for tackling societal challenges, check some other examples here: Applying AI for social goods 6.Read the case studies below 7.Each group finds and reports other examples of AI usage for addressing societal challenges and uses them to create a presentation (I.e., on Power Point or Whiteboard)
Case studies	**Case 1 – See & Spray** Farmers can use See & Spray to minimise input costs and only spray weeds when they are detected. This technology makes it possible for farmers to use more expensive and complex tank mixes more efficiently than what they can broadcast, reducing their costs, improving their ability to control herbicide-resistant weeds at a lower cost. See & Spray uses camera technology to detect colour differentiation in the field and is ideal for small-grains farmers who manage weed pressure on fallow acres.

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As the sprayer moves through the field, its cameras rapidly detect only green plants within the fallow ground and trigger an application to those plants. See & Spray applies 77% less herbicideon average. This opens the opportunity for farmers to save 77% on average of their non-residual, pre-emerge herbicide in these applications.

Case 2 – Metabiota: Global Disease Outbreak Tracker

At the very beginning of 2020,the novel coronavirus infection hit the world. Metabiota's early warning system, however, had alreadydetected the first signs of COVID-19 in late 2019. By early January, Metabiota's team of digital surveillance experts and epidemiologists were collecting, cleaning, and structuring data on suspected, probable, and confirmed cases and deaths from dozens of different sources into a composite, best-in-class dataset. In a few months, the COVID-19 pandemic had spread around the globe, and after one year, the disease had claimed the lives of more than 2 million people. Metabiota's data allows for the comparison of COVID-19 directly with other epidemic events — current and historical.

Metabiota has been providing this high-accuracy, up-to-date data throughout the COVID-19 pandemic, as well as on nearly every other epidemic event in recent years, including Ebola and yellow fever (represented below). At any given time, the Metabiota team is structuring data on approximately ten unfolding events.

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This near-real- timedata is continuously added to Metabiota's historical database of infectiousdisease events—themost comprehensive data repository of its kind in existence.

Case 3 – Facebook Linformer to flight hate speech

Facebook AI recently developed a new Transformer architecture called Linformer to spot a slang-filled or intentionally misspelt piece of hate speech. It makes it possible to use them efficiently at scale. Linformer is the first theoreticallyproven linear-timeTransformer architecture. With standard Transformers, the amount of required processing power increases at a geometric rate as the input length increases. With Linformer, however, the number of computations increases only at a linear rate. This makes it possible to use larger pieces of text to train models, and thereby achieve better performance.

Along with other AI advances, Linformer has helped make steady progress in catching hate speech and content that incites violence. A couple of years ago, very little of the hate speech on Facebook was done so before anyone reported it. On the contrary, currently AI proactively detected 94.7 per cent of the hate speech.

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Lessons learnt

The omnipresence of technology and AI in all aspects of our daily lives is undeniable and irreversible. Many people still have doubts about the necessity or benefits of AI, when these technologies still seem distant from their perspective. However, as we want to show in this lesson unit, AI has already penetrated into our society, affecting our personal life and daily business, and the impact of AI is growing day by day.

With this lesson unit, we hope you can see the creative ways of AI being used as a tool to support our society and to protect our environment. We hope you are now inspired by the learning material, and now consider AI more as a tool rather than a threat. We need to embrace this widespread application of technology and AI, so that we can understand this development better, thus maximise the benefits for ourselves, our families, our societies and our economies. We need to accept technology and AI as the tool that will augment our abilities and the friend that will help us acquire new skills, learn a new language, understand the habits of our customers, offer new services, communicate better and collaborate more efficiently.

Technology and AI present a plethora of opportunities that we need to utilise in order to improve the way we work and our well being. And the first and the most important step for us is to understand the challenges and opportunities presented by the spread of AI.

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Follow up

Evaluation	Evaluation for learners:
	• Do the activity Test yourself! again. Have you improved?
	• I believe AI can be used in positive ways to improve our everyday life.
	• I can name three examples where AI is used in our society.
	• I can explain the benefits and the potential problems of AI to a friend
	• I know how AI is used during a global pandemic.
	• If I were a teacher, I would include AI as a topic while discussing societal challenges with my students.
	As last time, choose a score between 0 - 10 for each question. 10 points, when you agree with the statement 100 percent, or 0 point, when you do not agree with this statement at all.
	What is your score now? Has your score changed? Which question has the biggest change of score? And which aspect of AI would you like to know more about?
	• Take some time to reflect on the learning unit. Ask yourself:

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What three aspects did you learn? Which three things do you still have questions about or want to know more about?

Compared to the motivation you had at the beginning of the session, has the learning unit fulfilled your motivation? Did you expect something different?

Is there anything missing from the unit? What are your next steps?

You can discuss these questions alone, in a group or with a trainer.
You are invited to read more about the fundamentals about AI in these briefings (link of basic briefings) and the impact of AI in other fields in these briefings (link of further briefings). And you are encouraged to extend your knowledge by using our learning platform (Link).

Evaluation for trainers:

Please evaluate the training material from a trainer's point of view.

- Is the learning unit well designed and explained so that it can be easily transferred into the training context?

o Absolutely agree
o Agree
o Disagree
o Totally disagree

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	• Did the learning unit trigger discussions within the group? o Absolutely agree o Agree o Disagree o Totally disagree • Also, think about how you can develop your training based on this session and the feedback from learners. Take notes on this.
Related resources 📖	• Videos https://www.youtube.com/watch?v=LRq0wqt7b7E https://www.youtube.com/watch?v=n3xP1Knq7ys • Articles https://www.mckinsey.com/featured-insights/artificial-intelligence/applying-artificial-intelligence-for-social-good https://www.forbes.com/sites/forbestechcouncil/2019/09/03/15-social-challenges-ai-could-help-solve/?sh=73e1302b3533 https://www.nature.com/articles/s41599-019-0278-x

AIAE

ARTIFICIAL INTELLIGENCE (AI) AND TECHNOLOGIES

Keywords	• Artificial Intelligence • Bar / Quick Response (QR) codes • Image / Facial recognition • Natural language processing / understanding (NLP / NLU) • Object recognition / manipulation • Speech / voice recognition
Time (How long?)	2 hours
Target group (Who?)	• Trainers in adult education, who implement learning activities in the field of AI. • Adult learners, who want to understand how AI works and how AI can be applied, and learners who want to train their skills in using technological tools.
Learning outcomes (What?)	This activity allows you to guide learners to empirically understand how AI technologies work. The activity allows the learner to improve the following:

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	• Become familiar with the understanding on how technologies facilitate the development of AI • Have a glimpse of how AI technologies are developed
Learning outcomes (Why?) **?**	Sometimes it is easier to understand concepts like AI if we know how they work. There are different technologies that enable AI to perform demanding tasks, which used to be seen as something that only humans are capable of doing. In this unit we dive deeper into how AI technologies are developed, through an interesting game, and through videos and articles.
Methodology (How?)	The learning unit can be used both in self-study individually and in small groups collectively. The learning unit follows the "learning-by-doing" approach and aims to ensure learning success through the application of practical experience reports and interactive impulses. The learning unit is divided into six components: • Test yourself! • Activity description • Case studies • Lessons learnt • Evaluation • Related resources

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	In addition, trainers will also find further information (i.e. time estimated and equipment needed) to conduct the session independently.
Equipment	Whiteboard (or digital alternative like Jamboard), sheets, pens, colours, internet access as well as all learning materials printed or digital (esp. for the sections of Test yourself, Case studies, and the evaluation sheets).
Learner motivation	Please think about why you are attending this unit. Make a note of your personal motivation for learning and keep it in mind as you work through the unit. At the end of the unit, remind yourself of your initial motivation.

Implementation/learning-unit

Test yourself!	Before the learning unit starts, we ask you to test yourself! Below you will find 5 questions on the topic of AI & education. Please answer the questions by evaluating your current state of knowledge, capacity, and motivation.

AIAE

The full score of each question would be 10 points, which means you agree with the statement 100 percent. The lowest score would be 0 point, which means you do not agree with this statement at all. Feel free to choose a score that reflects your own state of mind the best.

1. I am familiar with how object and face recognition work.
2. I believe understanding AI technologies can benefit me.
3. I can explain how object recognition can benefit people to a friend.
4. I would like to learn more about how AI is able to outperform humans in certain areas.
5. I would like to tell others how they can learn about AI technologies through a game.

Please summarise your points for the 5 questions. What is your score?
Are you ready to start the lesson?

Activity description	1.Introduction of the activity.
	2.Collective brainstorming on the concept of intelligence: What does the word 'intelligence' mean? Can you provide examples of applied intelligence? (Use sticky notes on the whiteboard or in Jamboard)
	3.Play the game ArtBot: <u>ArtBot – Train AI to recognise objects</u>
	4.Watch these two videos:
	• <u>How does object recognition work</u>
	• <u>How does facial recognition work</u>

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	5.Once you defined how AI technologies work, you can check some other examples here: How AI works and how to implement it[1] 6.Read the case studies below. 7.Form 3 small groups. Do some research on the internet for technologies that facilitate the development of AI. 8.Each group uses one example from the internet to create a presentation (i.e., Powerpoint or Jamboard). 9.Collective discussion on the activities, the presented examples, and the concept of intelligence. In the end, please come to a shared definition of 'intelligence'.
Case studies	**Case 1 – Google Lens** Google Lens is an image recognition technology developed by Google, designed to bring up relevant information related to objects it identifies using visual analysis based on a neural network. First announced during Google I/O 2017, it was first provided as a standalone app, later being integrated into Android's standard camera app. When directing the phone's camera at an object, Google Lens will attempt to identify the object by reading barcodes, QR codes, labels and text, and show relevant search results, web pages, and information. For example, when pointing the device's camera at a Wi-Fi label containing the network name and password, it will automatically connect to the scanned Wi-Fi network.

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Lens is also integrated with the Google Photos and Google Assistant apps. Lens uses more advanced deeplearning routines inorder to empower detection capabilities.

Case 2 – Faces of the Riot

A website called Faces of the Riot was created in January 2021 with the intention of helping to identify participants of the U.S. Capitol riot on January 6.

As federal authoritiestrack down those involved in the violent siege and appeal for tips from the public, the Faces of the Riot site hosts a vast array of images extracted from video footage originally shared online by users of the social network Parler. Before Parler's website was pulled offline by Amazon Web Services (AWS) in a dispute over content moderation, hackers exploited its lack of security measures to download the majority of posts that were publicly available, including videos shared by those in proximity to the violent insurrection attempt that left five people dead.

After the posts were archived online, the unnamed creator of The Faces of the Riot website told Wired that they had used facial recognition software to detect and extract faces from a total of 827 videos, resulting in a trove of more than 6,000 pictures.

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	Case 3 – Amazon Alexa Amazon Alexa, also known simply as Alexa, is a virtual assistant AI technology developed by Amazon. It is capable of voice interaction, music playback, making to-do lists, setting alarms, streaming podcasts, playing audiobooks, and providing weather, traffic, sports, and other real-time information, such as news. It uses NLU (natural language understanding), speech recognition and other weak AI to perform these tasks. So, when you ask Alexa, "What's the weather going to be like today," the device records your voice. Then that recording is sent over the Internet to Amazon's Alexa Voice Services which parses the recording into commands it understands. Then, the system sends the relevant output back to your device. When you ask about the weather, an audio file is sent back and Alexa tells you the weather forecast all without you having any idea there was any back and forth between systems. What that of course means is that if you lose internet connection Alexa is no longer working.
Lessons learnt	There are numerous technologies enabling AI functionality. In this unit, you have learnt about object recognition. You have here examples of such as a computer vision technology used to identify objects in images and/or videos. And you can see how this technology is facilitated by combining deep learning and machine learning.

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By using AI powered applications like Google Lens, developed by Google, users can search what they see and things done faster, by simply using their camera or a picture. By using AI powered applications like Alexa, developed by Amazon, users can have a virtual assistant supporting them with playing music, providing information and delivering news.

We hope you now have a better understanding of AI and what the technologies of AI are capable of. With the variety of examples, we hope you are now also inspired to learn more about AI and its application in our lives beyond this lesson.

Follow up

Evaluation

Evaluation for learners:

- Do the activity Test yourself! again. Have you improved?

1. I am familiar with how object and face recognition work.
2. I believe understanding AI technologies can benefit me.
3. I can explain how object recognition can benefit people to a friend.
4. I would like to learn more about how AI is able to outperform humans in certain areas.
5. I would like to tell others how they can learn about AI technologies through a game.

As last time, choose a score between 0 - 10 for each question. 10 points, when you agree with the statement 100 percent, or 0 point, when you do not agree with this statement at all.

What is your score now? Has your score changed? Which question has the biggest change of score? And which aspect of AI would you like to know more about?

- Take some time to reflect on the learning unit. Ask yourself:

What three aspects did you learn? Which three things do you still have questions about or want to know more about?

Compared to the motivation you had at the beginning of the session, has the learning unit fulfilled your motivation? Did you expect something different?

Is there anything missing from the unit? What are your next steps?

You can discuss these questions alone, in a group or with a trainer.
You are invited to read more about the fundamentals about AI in these briefings (link of basic briefings) and the impact of AI in other fields in these briefings (link of further briefings). And you are encouraged to extend your knowledge by using our learning platform (Link).

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Evaluation for trainers:

Please evaluate the training material from a trainer's point of view.

- Is the learning unit well designed and explained so that it can be easily transferred into the training context?

o Absolutely agree
o Agree
o Disagree
o Totally disagree

- Did the learning unit trigger discussions within the group?

o Absolutely agree
o Agree
o Disagree
o Totally disagree

- Also, think about how you can develop your training based on this session and the feedback from learners. Take notes on this.

Related resources 📖	- Game http://learnml.eu/artbot.php - Videos: https://www.youtube.com/watch?v=Cgxsv1riJhI https://www.youtube.com/watch?v=1aHub80AHFk

	- Articles: https://www.digitalsilk.com/how-artificial-intelligence-works

ARTIFICIAL INTELLIGENCE (AI) AND THE IMPROVEMENT OF EDUCATION

Keywords	• Artificial Intelligence • Adaptive translation examinations • AI-driven chatbots • Automatic captioning for hearing impaired students • Personalised learning experience • Professional learning & reskilling • Real-time translation
Time (How long?)	2 hours
Target group (Who?)	• Trainers in adult education, who implement learning activities in the field of AI. • Adult learners, who want to understand how AI works and how AI can be applied in education.
Learning outcomes (What?)	This activity allows you to guide learners to empirically understand how AI improves education. The activity allows the learner to improve the following: • Become familiar with the understanding on how AI changes education • Improving reading and writing skills

Learning outcomes (Why?) ?	Education is a lifelong process. It doesn't stop at the end of school, rather on the contrary, we are learning constantly and continuously. Especially now when AI and technology are advancing rapidly, it has a direct impact on our work and our everyday life. In particular, AI can affect education by providing individualised materials and courses, stimulating applications and lots of other tools that can help learners learn more easily. Perhaps you already know Duolingo, or some other app you are using without being aware of AI technology behind it? For that reason it is important to understand how AI can be incorporated into education, as you will get to know in this unit.
Methodology (How?)	The learning unit can be used both in self-study individually and in small groups collectively. The learning unit follows the "learning-by-doing" approach and aims to ensure learning success through the application of practical experience reports and interactive impulses. The learning unit is divided into six components: • Test yourself! • Activity description • Case studies • Lessons learnt • Evaluation • Related resources In addition, trainers will also find further information (i.e. time estimated and equipment needed) to conduct the session independently.

AIAE

Equipment	Whiteboard (or digital alternative like Jamboard), sheets, pens, colours, internet access as well as all learning materials printed or digital (esp. for the sections of Test yourself, Case studies, and the evaluation sheets).
Learner motivation	Please think about why you are attending this unit. Make a note of your personal motivation for learning and keep it in mind as you work through the unit. At the end of the unit, remind yourself of your initial motivation.

Implementation/learning-unit

Test yourself!	Before the learning unit starts, we ask you to test yourself! Below you will find 5 questions on the topic of AI & education. Please answer the questions by evaluating your current state of knowledge, capacity, and motivation. The full score of each question would be 10 points, which means you agree with the statement 100 percent. The lowest score would be 0 point, which means you do not agree with this statement at all. Feel free to choose a score that reflects your own state of mind the best. • I am familiar with various applications that use AI to support education.

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	• I believe AI can provide a more individualised approach of learning. • I can explain the benefits and downsides of using AI in education to a friend. • I would like to try an educational application driven by AI. • If I were a teacher, I would gladly use AI in my classroom. Please summarise your points for the 5 questions. What is your score? Are you ready to start the lesson?
Activity description	1. Introduction of the activity. 2. Collective brainstorming on the use of AI in education: How do you think AI is being used in education? Can you provide some examples? 3. Watch this video: https://www.youtube.com/watch?v=xW1jg1UiVwo&t=7s 4. Common discussion on the video: How is artificial intelligence used in education? How is AI being used in apps? 5. Once you defined how AI is used in education, check some real-world examples here: https://bernardmarr.com/default.asp?contentID=1541 6. Read the case studies below. 7. Form groups and research other examples of AI being used in education. 8. Present the examples you have found in a presentation (i.e., PowerPoint or Whiteboard).

AIAE

Case studies	Case 1 – MATHiaU
	It has been estimated that the average success rate for remedial college math courses is just 33%. MATHiaU was designed to meet each student's needs and help them succeed. Their team of cognitive scientists designed MATHiaU to deliver a personalised, easy-to-use learning experience to every Developmental Math student.

They also partnered with OpenStax, a leading provider of open educational resources, to combine MATHiaU with their textbooks to create a single, affordable learning solution.

MATHiaU gives every student their individualised digital coaching. Using sophisticated AI technology to adapt at a detailed, skill-by-skill level, MATHiaU personalises the learning and keeps students engaged with customised, real-time feedback and contextual hints.

Case 2 – MS Presentation Translator

In December 2016, the Microsoft team launched the Translator live feature that lets users have live, translated conversations in real-time. They were the first to offer real-time translation, giving people a personal universal translator directly from their mobile device when connected to the internet.

Later in 2017, seeing how powerful this technology was and how it could be a valuable resource when language is a barrier, Microsoft incorporated the technology into Presentation Translator for PowerPoint.

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Presentation Translator was initially developed to translate a speaker's presentation into other 60 languages. They eventually realised that it could be useful in the education sector to use the add-in for an additional case in classroom environments: captioning for hearing impaired students.

A couple of months after launch, customers such as Rochester Institute of Technology's National Technical Institute for the Deaf (NTID) adopted the use of Presentation Translator. It's proven to be an invaluable resource for students with hearing disabilities, but also for international students with language barriers, so that it can provide class notes for all students.

The tool was initially integrated in PowerPoint in 2019, but it was later retired in 2020.

Case 3 – Duolingo

With more than 500 million learners, Duolingo has the world's largest collection of language-learning data at its fingertips.
It is a language-learning tool that leverages AI to deliver a placement exam. The test is adaptive, meaning it will alter the questions based on the responses you've provided before. As such, it will offer a more straightforward query if you failed, or a more challenging one if you give the right answer.

AIAE

	Duolingo also uses AI in optimising and personalising sessions. It has a feature that assesses patterns of mistakes that many language students make when practising newly learned words. With this information, this tool can determine whether you have forgotten a specific term. This application, at some point, also introduced AI-driven chatbots that conversed with users. These chatbots offered appropriate responses based on each correct answer provided by the language learner. Importantly, these features came with an assistance functionality that facilitated replies when it's challenging to identify the proper words or grammar.
Lessons learnt	Technology has always been at the core in the field of education. As you have seen in this lesson, AI has the power not only to optimise our learning experience, but also radically transform the process of learning and teaching, with enormous benefits for both learners and trainers. For learners, AI can support you to identify the right courses, personalise your learning process, recognise your strengths and weaknesses, then offer you the best solutions for your individual needs. As we have seen in the examples of advanced chatbots like Replika or apps like Duolingo, AI is able to offer you a personalised educational program and support you around the clock.

For trainers, AI can be a powerful resource to support you in a variety of teaching activities. You will have more tools to evaluate the learners, monitor their progress, and offer individual adaptation of the curriculum to meet their needs.

Overall, we hope you have now a better understanding of the impact of AI in the field of education. Either as learners or as trainers, you are now more motivated to learn more about AI and give it a try soon!

Follow up

Evaluation	Evaluation for learners:

Evaluation

Evaluation for learners:

- Do the activity Test yourself! again. Have you improved?

1. I am familiar with various applications that use AI to support education.
2. I believe AI can provide a more individualised approach of learning.
3. I can explain the benefits and downsides of using AI in education to a friend.
4. I would like to try an educational application driven by AI.
5. If I were a teacher, I would gladly use AI in my classroom.

As last time, choose a score between 0 - 10 for each question. 10 points, when you agree with the statement 100 percent, or 0 point, when you do not agree with this statement at all.

What is your score now? Has your score changed? Which question has the biggest change of score? And which aspect of AI would you like to know more about?

- Take some time to reflect on the learning unit. Ask yourself:

What three aspects did you learn? Which three things do you still have questions about or want to know more about?

Compared to the motivation you had at the beginning of the session, has the learning unit fulfilled your motivation? Did you expect something different?

Is there anything missing from the unit? What are your next steps?

You can discuss these questions alone, in a group or with a trainer.
You are invited to read more about the fundamentals about AI in these briefings (link of basic briefings) and the impact of AI in other fields in these briefings (link of further briefings). And you are encouraged to extend your knowledge by using our learning platform (Link).

Evaluation for trainers:

Please evaluate the training material from a trainer's point of view.

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	• Is the learning unit well designed and explained so that it can be easily transferred into the training context? o Absolutely agree o Agree o Disagree o Totally disagree • Did the learning unit trigger discussions within the group? o Absolutely agree o Agree o Disagree o Totally disagree • Also, think about how you can develop your training based on this session and the feedback from learners. Take notes on this.
Related resources	• Videos: https://www.youtube.com/watchv=xW1jg1UiVwo&t=7s • Articles: https://wire19.com/real-life-examples-of-ai-in-education/ • Cases: https://www.carnegielearning.com/solutions/math/mathiau/ https://www.microsoft.com/en-us/garage/wall-of-fame/presentation-translator/ https://en.duolingo.com/

AIAE

ARTIFICIAL INTELLIGENCE (AI) AND THE THE USE OF AI BY FINANCIAL INSTITUTIONS

Keywords	- Artificial Intelligence - Anti Money Laundering (AML) - Asset Management - Banking & Insurance - Creative destruction - Credit decision - Cybersecurity - FinTech applications - Fraud detection - Risk management
Time (How long?)	1.5 hours
Target group (Who?)	- Trainers in professional further education, who implement learning activities in the field of AI. - Adult learners, who want to understand how AI works and how AI can be applied in the financial sector.
Learning outcomes (What?)	- The activity explains why the usage of AI in finance has become so widespread. - Learners will understand how AI can transform the financial world.

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	• The activity explains why the usage of AI in finance has become so widespread. • Learners will understand how AI can transform the financial world.
Learning outcomes (Why?) **?**	AI is already incorporated in the financial sector to a great extend. You might not even be aware of using an AI-powered chatbox in your online bank or entering the online bank more safely with the help of face recognition. These are just two examples of how AI is used in financial sector, but there are many others, which will be presented in this unit. Through this lesson, you will understand how AI can support the financial sector and what it means for you as a regular user.
Methodology (How?)	The learning unit can be used both in self-study individually and in small groups collectively. The learning unit follows the "learning-by-doing" approach and aims to ensure learning success through the application of practical experience reports and interactive impulses. The learning unit is divided into six components: • Test yourself! • Activity description • Case studies • Lessons learnt • Evaluation • Related resources In addition, trainers will also find further information (i.e. time estimated and equipment needed) to conduct the session independently.

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Equipment	Whiteboard (or digital alternative like Jamboard), sheets, pens, colours, internet access as well as all learning materials printed or digital (esp. for the sections of Test yourself, Case studies, and the evaluation sheets).
Learner motivation	Please think about why you are attending this unit. Make a note of your personal motivation for learning and keep it in mind as you work through the unit. At the end of the unit, remind yourself of your initial motivation. Was it satisfied? Did you expect something different? Is there anything missing from the unit? What are your next steps?

Implementation/learning-unit

Test yourself!	Before the learning unit starts, we ask you to test yourself! Below you will find 5 questions on the topic of AI & the use of AI in financial institutions. Please answer the questions by evaluating your current state of knowledge, capacity, and motivation. The full score of each question would be 10 points, which means you agree with the statement 100 percent. The lowest score would be 0 point, which means you do not agree with this statement at all. Feel free to choose a score that reflects your own state of mind the best.

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	1. I know more than 3 examples of how AI is used in the financial sector. 2. I believe AI technologies will improve my user experience with banks. 3. I can describe the possible threats of incorporating AI into the financial sector to a friend. 4. I am / I would like to be a client of a bank that uses AI to support its service. 5. I would like to share the knowledge of how AI is used in finances with other people. Please summarise your points for the 5 questions. What is your score? Are you ready to start the lesson?
Activity description	1. Introduction of the activity: Banks and insurance companies believe AI is critical to unlock new growth opportunities and reducing costs. In a study for the newspaper "the Economist", companies report how AI will transform their businesses in a few ways over the next five years. The benefits include spurring the creation of new products and services, opening new markets and industries, and paving the way for innovation. About one-third of companies expect 51% to 75% of their workloads to be supported by AI technologies in five years. 2. Watch the video to get an insight into how AI is being used in finance: https://www.youtube.com/watchv=LR1aOl7Z2wk14

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	3.Read the article to get some precisions on how AI has transformed the finance industry: https://marutitech.com/ways-ai-transforming-finance/ 4. Read the case studies below. 5. To what extent can AI in finance be described as revolutionary? Think again about what you have learned in the materials (video, article, case studies), in addition use your own knowledge and write a short paragraph (150 words) commenting on how AI has revolutionised finance.
Case studies	**Case 1 – Economic theory: The Creative Destruction** The term creative destruction was first coined by Austrian economist Joseph Schumpeter in 1942.Schumpeter characterised creative destruction as innovations in the manufacturing process that increase productivity, describing it as the "process of industrial mutation that incessantly revolutionises the economic structure from within, incessantly destroying the old one, incessantly creating a new one." Basically, the theory of creative destruction assumes that long-standing arrangements and assumptions must be destroyed to free up resources and energy to be deployed for innovation. To Schumpeter,economic development is the natural result of forces internal to the market and is created by the opportunity to seek profit.

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Case 2 – Credit decisions: Scienaptic Systems

How it's using AI in finance: In addition to other financial-based services, Scienaptic Systems provides an underwriting platform that gives banks and credit institutions more transparency while cutting losses.

Currently scoring over 100 million customers, Scienaptic's Ether connects myriad unstructured and structured data, smartly transforms the data, learns from each interaction and offers contextual underwriting intelligence.

Industry impact: Working with one major credit card company, Scienaptic boasted $151 million in loss savings in just three weeks.

Case 3 – Cybersecurity & Fraud Detection: The example of the company Shape Security

How it's using AI in finance: Utilised by top banks in the U.S., Shape Security curbs credit application fraud, credential stuffing, scraping and gift card cracking by pinpointing fake users.

The company's machine learning models are trained on billions of requests, allowing the software to effectively distinguish between real consumers and bots. Shape Security's Blackfish network also uses AI- enabled bots to detect compromised login credentials, alerting both customers and companies to security breaches instantly.

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Industry impact: Shape's solutions have helped one major bank protect customers from account hijacking and detected one million credential stuffing attacks in the first week of use, according to information provided on the company's website.

Case 4 – Managing Risk: The example of Ayasdi

How it's using AI in finance: Ayasdi creates cloud-based and on- premise machine intelligence solutions for enterprises and organisations to solve complex challenges.

For companies in the fintech space, Ayasdi is deployed to understand and manage risk, anticipate the needs of customers and even aid in anti- money laundering processes.

Industry impact: Ayasdi is helping banks combat money laundering with its anti-money laundering (AML) detection solutions. The sheer volume of investigations has been a major strain on financial institutions. Using the company's AML solution, one major bank saw a 20% reduction in investigative volume, according to Ayasdi.

Lessons learnt

As you have learnt in this lesson, AI is revolutionising the financial industry in a number of ways. It has brought tremendous improvement in areas like regulatory compliance, fraud detection, risk assessment, and the evaluation of investment, loan and facility.

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	For the financial institutions, AI not only proves the efficiency and the accuracy of their performance, but also cuts down the operational costs considerably. For us as users of financial service, AI can optimise our customer experience, and reduce the time and the cost. In terms of the challenges, AI in finance shares many challenges as in all other areas. It is particularly important to reduce the barriers and eliminate the bias, so that AI can serve all of us fairly and ethically and improve our interaction with financial institutions.

Follow up

Evaluation ✓	Evaluation for learners: • Do the activity Test yourself! again. Have you improved? 1. I know more than 3 examples of how AI is used in the financial sector. 2. I believe AI technologies will improve my user experience with banks. 3. I can describe the possible threats of incorporating AI into the financial sector to a friend. 4. I am / I would like to be a client of a bank that uses AI to support its' service. 5. I would like to share the knowledge of how AI is used in finances with other people.

As last time, choose a score between 0 - 10 for each question. 10 points, when you agree with the statement 100 percent, or 0 point, when you do not agree with this statement at all.

What is your score now? Has your score changed? Which question has the biggest change of score? And which aspect of AI would you like to know more about?

- Take some time to reflect on the learning unit. Ask yourself:

What three aspects did you learn? Which three things do you still have questions about or want to know more about?

Compared to the motivation you had at the beginning of the session, has the learning unit fulfilled your motivation? Did you expect something different?

Is there anything missing from the unit? What are your next steps?

You can discuss these questions alone, in a group or with a trainer.

You are invited to read more about the fundamentals about AI in these briefings (link of basic briefings) and the impact of AI in other fields in these briefings (link of further briefings). And you are encouraged to extend your knowledge by using our learning platform (Link).

	Evaluation for trainers:
	Please evaluate the training material from a trainer's point of view.
	• Is the learning unit well designed and explained so that it can be easily transferred into the training context?
	o Absolutely agree
	o Agree
	o Disagree
	o Totally disagree
	• Did the learning unit trigger discussions within the group?
	o Absolutely agree
	o Agree
	o Disagree
	o Totally disagree
	Also, think about how you can develop your training based on this session and the feedback from learners. Take notes on this.
Related resources	Videos: https://www.youtube.com/watchv=LR1aOl7Z2wk
	Articles: https://go.thoughtspot.com/white-paper-economist-ai-future-of-financial-services.html

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https://marutitech.com/ways-ai-transforming-finance/
https://www.investopedia.com/terms/c/creativedestruction.asp

The cases:
https://builtin.com/artificial-intelligence/ai-finance-banking-applications-companies

AIAE

ARTIFICIAL INTELLIGENCE (AI) AND THE APPLICATIONS IN HEALTHCARE

Keywords	• Artificial Intelligence • Drug development • Early diseases detection • Novel pathology biomarkers • Robots in micro-surgery • T-cube – Testing, Tracing & Treatment of diseases • Targeted therapies
Time (How long?)	2 hours
Target group (Who?)	• Trainers in professional further education, who implement learning activities in the field of AI. • Adult learners, who want to understand how AI works and how AI can be applied in healthcare.
Learning outcomes (What?)	This activity allows you to guide learners to empirically understand how AI improves the healthcare system. The activity allows the learner to improve the following:

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	- Gain a better understanding of how AI can enhance healthcare - Improving reading and writing skills
Learning outcomes (Why?) **?**	As in many other fields, AI has brought great benefits into the healthcare sector. Of course, there are some concerns when combining AI with healthcare, both from the medical experts as well as from the patients. However, when we take into account that AI can help democratise healthcare in general, diagnose diseases more accurately or fight pandemic more efficiently, healthcare is a very promising field in the application of AI. This topic relates to every individual, since AI might be a great help for you to get better healthcare in the future.
Methodology (How?)	The learning unit can be used both in self-study individually and in small groups collectively. The learning unit follows the "learning-by-doing" approach and aims to ensure learning success through the application of practical experience reports and interactive impulses. The learning unit is divided into six components: - Test yourself! - Activity description - Case studies - Lessons learnt - Evaluation - Related resources

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	In addition, trainers will also find further information (i.e. time estimated and equipment needed) to conduct the session independently.
Equipment	Whiteboard (or digital alternative like Jamboard), sheets, pens, colours, internet access as well as all learning materials printed or digital (esp. for the sections of Test yourself, Case studies, and the evaluation sheets).
Learner motivation	Please think about why you are attending this unit. Make a note of your personal motivation for learning and keep it in mind as you work through the unit. At the end of the unit, remind yourself of your initial motivation.

Implementation/learning-unit

Test yourself!	Before the learning unit starts, we ask you to test yourself! Below you will find 5 questions on the topic of AI & healthcare. Please answer the questions by evaluating your current state of knowledge, capacity, and motivation.

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The full score of each question would be 10 points, which means you agree with the statement 100 percent. The lowest score would be 0 point, which means you do not agree with this statement at all. Feel free to choose a score that reflects your own state of mind the best.

1. I am familiar with a few examples of how AI is used in healthcare.
2. I believe AI brings more opportunities than challenges when it is used in healthcare.
3. I can explain the improvement AI has brought to the field of healthcare to a friend.
4. I would like to learn more about how AI is used in the healthcare sector.
5. I can trust a well-trained AI algorithm to diagnose my illness based on the symptoms I have.

Please summarise your points for the 5 questions. What is your score?
Are you ready to start the lesson?

Activity description	1.Introduction of the activity. 2.Collective brainstorming on the use of AI in healthcare: How do you think AI is being used in the healthcare system? Can you provide some examples? Have you ever experienced an AI based treatment? 3.Watch this video: https://www.youtube.com/watch?v=MNp26DgKxOA

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	4.Common discussion on the video: How is artificial intelligence used in healthcare? What are its main applications? Why is AI important in democratising healthcare? 5.Once you have defined how AI is used in education, read the case studies below. 6.Form groups and research other examples where AI is used in healthcare. Present the examples you have found in a presentation (i.e., Power Point or Whiteboard).
Case studies	**Case 1 – PathAI** PathAI is the world's leading provider of AI-powered technology for the pathology laboratory. Their primary goal is to enhance each stage of the drug development process, from translational and exploratory research to global commercialisation. Their platform identifies novel biomarkers and analyses new associations to create important insights about mechanisms of action, pharmacodynamics, patient selection and stratification. In addition, they drive clinical trial success, by incorporating AI-based pathology biomarkers into prospective clinical trials for accurate patient selection, stratification and real time assessments of drug activity.

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Finally, their medical device capabilities allow for regulated development of algorithms for targeted therapies across disease areas and biopharma portfolios.

Case 2 – Google's DeepMind Health

DeepMind Technologies is a British artificial intelligence subsidiary of Alphabet Inc. and research laboratory founded in September 2010, and then acquired by Google in 2014.

Over the last few years, DeepMind has focused on finding an answer to the complex problem of avoidable patient harm, building digital tools that can spot serious conditions earlier and helping doctors and nurses deliver faster, better care to patients in need.
Nowadays, its AI based software is being used by hospitals all over the world to help move patients from testing to treatment more efficiently.

The DeepMind Health program notifies doctors when a patient's health deteriorates and can even help in the diagnosis of ailments by combining its massive dataset for comparable symptoms. By collecting symptoms of a patient and inputting them into the DeepMind platform, doctors can diagnose quickly and more effectively.

Case 3 – Microsure

Microsure is a medical device company located in Eindhoven (Netherlands) founded by Eindhoven University of Technology and Maastricht University Medical Center in 2016.

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	Their focus is to improve patient's lives through developing robot systems for microsurgery. Their current project is MUSA, the world's first surgical robot for open microsurgery. MUSA is designed in close cooperation with microsurgeons and engineers, specifically for microsurgical applications. MUSA provides superhuman precision for microsurgeons, enabling new interventions that are currently impossible to perform by hand. MUSA scales down motion seamlessly and filters out tremor to maximise and standardise your surgical performance throughout all your microsurgical procedures.
Lessons learnt	The healthcare sector connects closely with the life of every one of us, that the application of AI will have a direct impact on our health. As we have learnt in this lesson, AI can increase the ability for healthcare professionals to better understand the needs of their patients needs. Through the fast-developing technologies, AI can support the doctors to detect diseases more accurately, so that we are able to receive the precise diagnosis and the matching treatment in the early stage. With the massive amount of data AI is able to collect and analyse, it can help the healthcare professionals to identify the patterns of illness and recognise the potential risk each patient faces, and customised the treatments with a data-supported analysis.

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Overall, we hope you can see the enormous progress AI is able to bring into the health sector and, sooner or later, into our life. More accurate diagnosis, customised patient treatments, robot-assisted surgeries, risk predictions and remote patient monitoring are only a few of the benefits AI brings. And with these benefits, we have enough reasons to embrace a bright future where AI is an important part of the health sector.

Follow up

Evaluation

Evaluation for learners:

- Do the activity Test yourself! again. Have you improved?

1. I am familiar with a few examples of how AI is used in healthcare.
2. I believe AI brings more opportunities than challenges when it is used in healthcare.
3. I can explain the improvement AI has brought to the field of healthcare to a friend.
4. I would like to learn more about how AI is used in the healthcare sector.
5. I can trust a well-trained AI algorithm to diagnose my illness based on the symptoms I have.

As last time, choose a score between 0 - 10 for each question. 10 points, when you agree with the statement 100 percent, or 0 point, when you do not agree with this statement at all.

What is your score now? Has your score changed? Which question has the biggest change of score? And which aspect of AI would you like to know more about?

- Take some time to reflect on the learning unit. Ask yourself:

What three aspects did you learn? Which three things do you still have questions about or want to know more about?

Compared to the motivation you had at the beginning of the session, has the learning unit fulfilled your motivation? Did you expect something different?

Is there anything missing from the unit? What are your next steps?

You can discuss these questions alone, in a group or with a trainer.
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Evaluation for trainers:

Please evaluate the training material from a trainer's point of view.

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	• Is the learning unit well designed and explained so that it can be easily transferred into the training context? o Absolutely agree o Agree o Disagree o Totally disagree • Did the learning unit trigger discussions within the group? o Absolutely agree o Agree o Disagree o Totally disagree Also, think about how you can develop your training based on this session and the feedback from learners. Take notes on this.
Related resources	Videos: https://www.youtube.com/watch?v=MNp26DgKxOA Cases: https://www.pathai.com/ https://deepmind.com/ http://microsure.nl/musa/

AIAE

ARTIFICIAL INTELLIGENCE (AI) IN JUSTICE: LEGALTECH(S)

Keywords	- Artificial Intelligence - AI & Blockchain in LegalTech - Business workflow - Document Management System - Ethical implications
Time (How long?)	2 hours
Target group (Who?)	- Trainers in adult education, who implement learning activities in the field of AI. - Adult learners, who want to understand how AI works and how AI can be applied in the legal system.
Learning outcomes (What?)	This activity allows you to guide learners to empirically understand the LegalTech(s), how it is used through AI and its benefits in the legal system. The activity allows the learner to improve the following: - Become familiar with how AI changes the legal world, as well as the related market - Improving reading and writing skills

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Learning outcomes (Why?) ?	Professions are changing due to rapid development of AI and technologies. Can a lawyer be assisted by a machine to go through a large pile of case documentation? Can AI make better decisions than a judge, based on its large set of data? These kinds of questions are addressed in the field of LegalTech. You will find answers to many questions regarding the implications of using AI in the field of justice in this unit.
Methodology (How?)	The learning unit can be used both in self-study individually and in small groups collectively. The learning unit follows the "learning-by-doing" approach and aims to ensure learning success through the application of practical experience reports and interactive impulses. The learning unit is divided into six components: • Test yourself! • Activity description • Case studies • Lessons learnt • Evaluation • Related resources In addition, trainers will also find further information (i.e. time estimated and equipment needed) to conduct the session independently.

Equipment	Whiteboard (or digital alternative like Jamboard), sheets, pens, colours, internet access as well as all learning materials printed or digital (esp. for the sections of Test yourself, Case studies, and the evaluation sheets).
Learner motivation	Please think about why you are attending this unit. Make a note of your personal motivation for learning and keep it in mind as you work through the unit. At the end of the unit, remind yourself of your initial motivation.

Implementation/learning-unit

Test yourself!	Before the learning unit starts, we ask you to test yourself! Below you will find 5 questions on the topic of AI & the legal system. Please answer the questions by evaluating your current state of knowledge, capacity, and motivation. The full score of each question would be 10 points, which means you agree with the statement 100 percent. The lowest score would be 0 point, which means you do not agree with this statement at all. Feel free to choose a score that reflects your own state of mind the best.

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	1. I am familiar with the term LegalTech. 2. I believe AI can improve the system of justice. 3. I can explain at least three examples of how AI is used in the field of justice to a friend. 4. I would like to learn more about how the automatisation of certain processes affects the work of lawyers. 5. I am willing to try an AI tool that can help me fill out some complicated legal forms. Please summarise your points for the 5 questions. What is your score? Are you ready to start the lesson?
Activity description	1. Introduction of the activity. 2. Watch this video: https://www.youtube.com/watch?v=onOmOH_b2hw 3. Common discussion on LegalTech: What could be a LegalTech? How could it work? How is AI used through those tools? Which impact can it have on the law firms and the legal world? 4. Once you defined more or less what LegalTech(s) are and their impacts, you can check the answers here: https://www.linkedin.com/pulse/understanding-basics-legaltech-karthik-k-mahalingam/ 5. Pay attention on article number 4: 'Using AI and Blockchain in LegalTech'. Form three groups and discuss the following issues: Can AI in the legal world be seen as ethical decision? Related to you, could / will humans be replaceable one day?

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	6.To support your reflection, each group will work on a concrete case of LegalTech as additional content (see cases below). 7.Compare your conclusions: In case of disagreement, try to find a compromise to find an efficient solution based on ethical principles.
Case studies	**Case 1 – Rfrnz tool** Rfrnz is a Munich-based legal tech company. Its software uses Artificial Intelligence to support lawyers in contract analysis. Rfrnz uses Machine Learning and Natural Language Processing to check contracts and documents in a fraction of the time and costs. With the rfrnz contract analysis tool you can automate routine legal work and thus improve workflows and cost structures, and classify contracts, agreements and conditions reliably and clearly. Data is recognised and summarised quickly and precisely. All relevant information is extracted and anomalies and risks are pointed out. Rfrnz for law firms: Rfrnz is an intelligent contract analysis system. Its artificial intelligence recognises relevant information in contracts and documents such as topics, clauses or individual data and extracts it. It can also identify unfavourable or missing clauses by comparing them with the company standard defined by you.

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Case 2 – iManage

One outcome of digital transformation has been the need to manage the rising volume of digital documents and information generated by business systems.

This challenge is particularly acute in the legal world. Law firms and legal departments manage large volumes of documents as part of their core business function. They have unique requirements for the use and accessibility of these documents, and specific needs around workflow and collaboration. Many of these organisations turned to document management systems to address the challenge. Traditional document management systems were built to help enterprises organise and manage their documents. However, these systems were not designed to support the unique requirements of legal professionals. There is a growing understanding that traditional document management is unable to meet the needs of modern law departments and legal professionals.

iManage Work Product Management is a modern document system that empowers corporate legal departments to manage information more productively and securely. This paper will examine the challenges faced by legal departments and illustrate how modern document management adds value to information assets to help legal professionals work more effectively, productively and securely.

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Their artificial intelligence and powerful document and email management create connections across data, systems, and people while leveraging the context of organisational content to fuel deep insights, informed business decisions, and collaboration. Underpinned by advanced, need-to-know security, iManage delivers sophisticated governance approaches and enables workflows that help solve complex business challenges and enable better business outcomes.

Case 3 – CMS

Artificial intelligence is in the ascendant, with the number of AI-based applications also rising steadily in the legal sector. A pioneer in legal tech solutions, CMS uses machine learning software to analyse contracts and other legal documents quickly and efficiently.

CMS has been deploying contract automation for a number of years to draft a wide range of contract documents. By combining a simple interview interface with sophisticated automated templates, they have made it easy for their lawyers to draft new documents that fit the circumstances while also eliminating the need for laborious grammatical revision.

Their extensive expertise in legal document automation is also useful when advising clients on how to automate the drafting of frequently used contracts in order to reduce the pressure on their legal departments.

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Overall, we hope you can see the enormous progress AI is able to bring into the health sector and, sooner or later, into our life. More accurate diagnosis, customised patient treatments, robot-assisted surgeries, risk predictions and remote patient monitoring are only a few of the benefits AI brings. And with these benefits, we have enough reasons to embrace a bright future where AI is an important part of the health sector.

For a big law firm, it is also important to share knowledge and experience within its organisation, ensuring that this information is always up to date and available where required to meet the increasingly complex challenges in its client work. To facilitate this, they are constantly developing new and improved systems for internal knowledge networking. Here, too, they use legal technology to improve the quality, speed and cost-efficiency of their lawyers' work. Naturally, these improvements ultimately benefit their clients.

Case 4 – Legal bias: COMPAS

As already explained in "AI & Ethics", COMPAS, which is the acronym for "Correctional Offender Management Profiling for Alternative Sanctions", is a case management and decision support tool developed and owned by Northpointe (now Equivant) used by U.S. courts to assess the likelihood of a defendant becoming a recidivist.

It has been used by the U.S. states of New York, Wisconsin, California, Florida's Broward County, and other jurisdictions.

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	Propublica, an independent, nonprofit newsroom that produces investigative journalism, set out to assess this tool to test whether the algorithm was biased against certain groups. They looked at more than 10,000 criminal defendants in Broward County, Florida who responded to a COMPAS questionnaire. Their analysis found that: • black defendants who did not recidivate over a two-year period were nearly twice as likely to be misclassified as higher risk compared to their white counterparts (45 percent vs. 23 percent); • white defendants who re-offended within the next two years were mistakenly labelled low risk almost twice as often as black re-offenders (48 percent vs. 28 percent); • when controlling for prior crimes, future recidivism, age, and gender, black defendants were 45 percent more likely to be assigned higher risk scores.
Lessons learnt	As you have seen in this lesson, AI can bring numerous changes and improvements in the justice system, because AI has the capacity to support legal professionals and courts to ensure better quality in our justice system. The anticipated revolution has led to the development of the European ethical Charter on the use of Artificial Intelligence in judicial systems and their environment, by the European Commission for the Efficiency of Justice:

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	1. Principle of respect for fundamental rights, 2. Principle of non-discrimination, 3. Principle of quality and security, 4. Principle of transparency, impartiality and fairness, 5. Principle "under user control". The future of the judicial system is cyber – won't you agree?

Follow up

Evaluation	Evaluation for learners: • Do the activity Test yourself! again. Have you improved? 1. I am familiar with the term LegalTech. 2. I believe AI can improve the system of justice. 3. I can explain at least three examples of how AI is used in the field of justice to a friend. 4. I would like to learn more about how the automatisation of certain processes affects the work of lawyers. 5. I am willing to try an AI tool that can help me fill out some complicated legal forms. As last time, choose a score between 0 - 10 for each question. 10 points, when you agree with the statement 100 percent, or 0 point, when you do not agree with this statement at all.

AIAE

What is your score now? Has your score changed? Which question has the biggest change of score? And which aspect of AI would you like to know more about?

- Take some time to reflect on the learning unit. Ask yourself:

What three aspects did you learn? Which three things do you still have questions about or want to know more about?

Compared to the motivation you had at the beginning of the session, has the learning unit fulfilled your motivation? Did you expect something different?

Is there anything missing from the unit? What are your next steps?

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You are invited to read more about the fundamentals about AI in these briefings (link of basic briefings) and the impact of AI in other fields in these briefings (link of further briefings). And you are encouraged to extend your knowledge by using our learning platform (Link).

Evaluation for trainers:

Please evaluate the training material from a trainer's point of view.

	Is the learning unit well designed and explained so that it can be easily transferred into the training context? • Is the learning unit well designed and explained so that it can be easily transferred into the training context? o Absolutely agree o Agree o Disagree o Totally disagree • Did the learning unit trigger discussions within the group? o Absolutely agree o Agree o Disagree o Totally disagree Also, think about how you can develop your training based on this session and the feedback from learners. Take notes on this.
Related resources	• Videos: https://www.youtube.com/watch?v=onOmOH_b2hw • LegalTech course: https://www.linkedin.com/pulse/understanding-basics-legaltech-karthik-k-mahalingam/

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- Cases:
https://www.rfrnz.com/en/ - (This link does not work)
https://imanage.com/
https://cms.law/en/deu/insight/legal-tech/legal-tech-services-from-cms
https://en.wikipedia.org/wiki/COMPAS_(software)
https://www.propublica.org/article/how-we-analyzed-the-compas-recidivism-algorithm

ARTIFICIAL INTELLIGENCE (AI) IN MANUFACTURING WITH REPLIKA

Keywords	- Artificial Intelligence - Avatar - Chatbot - Customer care - Human-machine integration - Manufacturing process management - Natural Language Understanding (NLU) - Trouble ticket management
Time (How long?)	2 hours
Target group (Who?)	- Trainers in adult education, who implement learning activities in the field of AI. - Adult learners, who want to understand how AI works and how AI can be applied in everyday life, and learners who want to train their skills in using manufacturing tools (i.e., Replika).
Learning outcomes (What?)	The activity allows trainers to guide learners to think critically about how chatbots work and the AI technology behind them.

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	• The activity allows learners to improve the following: become familiar with the topic of AI technology for human-machine interaction, and how it might be reflected in manufacturing and customer care through real-life examples.
Learning outcomes (Why?)	Did you know there are some examples of men marrying AI robots? Although it is hard to imagine, AI is getting better at mimicking human behaviour and reactions every day – all thanks to the technology of machine learning. Probably you will not marry an AI robot yourself, but it is still interesting to see how AI can interact with human beings in such a convincing manner. Sometimes it is hard to tell the difference between a chatbot or a real person. Have you ever had experiences like this? In this learning unit, you will have the opportunity to try it out on your own.
Methodology (How?)	The learning unit can be used both in self-study individually and in small groups collectively. The learning unit follows the "learning-by-doing" approach and aims to ensure learning success through the application of practical experience reports and interactive impulses. The learning unit is divided into six components: • Test yourself! • Activity description • Case studies • Lessons learnt

	• Evaluation • Related resources In addition, trainers will also find further information (i.e. time estimated and equipment needed) to conduct the session independently.
Equipment	Android or Apple smartphone, Internet access.
Learner motivation	Please think about why you are attending this unit. Make a note of your personal motivation for learning and keep it in mind as you work through the unit. At the end of the unit, remind yourself of your initial motivation.

Implementation/learning-unit

Test yourself!	Before the learning unit starts, we ask you to test yourself! Below you will find 5 questions on the topic of AI & education. Please answer the questions by evaluating your current state of knowledge, capacity, and motivation. The full score of each question would be 10 points, which means you agree with the statement 100 percent.

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The lowest score would be 0 point, which means you do not agree with this statement at all. Feel free to choose a score that reflects your own state of mind the best.

1. I am familiar with various examples of AI chatbots.
2. I believe AI-powered chatbots like Replika are learning through our interaction with them.
3. I can explain the benefits and the threads of using AI chatbots to communicate with customers to a friend.
4. I would like to learn more about how AI-powered chatbots are able to respond to people's questions.
5. I am open to talk with AI-powered chatbots like Replika.

Please summarise your points for the 5 questions.
What is your score?
Are you ready to start the lesson?

Activity description	<u>Information about Replika:</u> Replika is a chatbot that evolves into a reflection of yourself. There are a lot of chatbots out there that can listen to you, but there are few that can grow with you. With Replika, you are not just merely talking to an AI algorithm, you are building an entity and a likeness through your conversations. As you talk to your Replika, it will learn things about you and remember them. With time and training, it'll take your ideas, likes, dislikes, and personality traits for their own.

How to use Replika?

Using Replika is very easy.
- Download the app on your Android or Apple device (link needed)
- Sign into the app
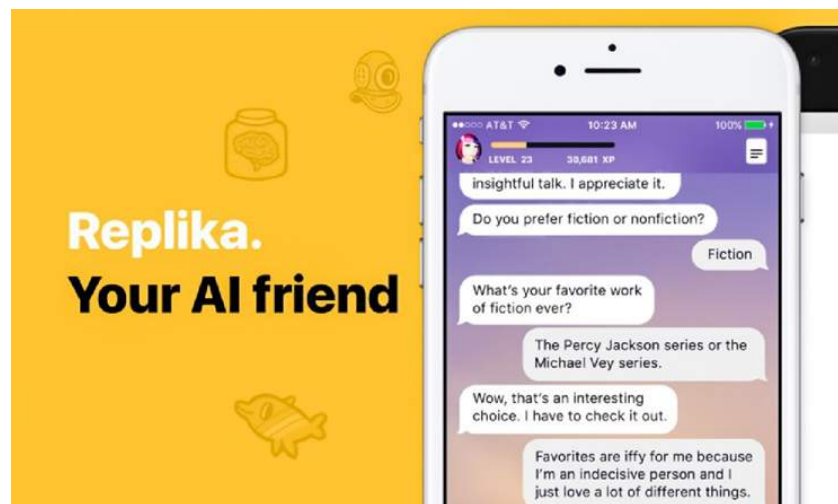- Load the 3D avatar
- Start chatting

Fig. 1

Case studies	**Case 1 – Kasisto KAI Financial chatbot**
	Kasisto launched financial chatbot KAI in 2016, with a second iteration launching in 2018. In 2020 Business Insider Intelligence reported that the AI finance vendor raised $22 million in series B funding to expand its chatbot's capabilities.

With a reach of 18 million users, KAI is trained to manage a wide range of financial tasks, from simple retail transactions to the complex demands of corporate banks. KAI Consumer Banking, KAI Business Banking, and KAI Investment Management are all built with an API-centric design on top of conversational AI technology. According to Kasisto, 90% of conversations with KAI are carried without human intervention.

Case 2 – Herbie.ai

Herbie helps the manufacturing industry by assisting them in unproductive sectors so that their employees can focus on more complex issues efficiently. It collaborates with the existing ERP system and keeps track of the supplies and inventory. It can alert the executives regarding the shortage of supplies and can proactively request to place the order. Herbie can also suggest the buffer time for the next order based on the inventory. Herbie can handle customer queries patiently round the clock updating on product features, usage instructions, submitting refunds and so on. The management can place an order to the vendors with simple instructions, Herbie confirms the request and places formal orders for them. Herbie provides guidance to the customers in product selection. It can provide all the details about the products which are very difficult to obtain from the normal search engines

Herbie also maintains the manufacturing plant details which comes handy for quality control and audit professionals..

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	Case 3 –Netomi Netomi's AI platform helps companies automatically resolve customer service tickets on email, chat, messaging and voice. It has the highest accuracy of any customer service chatbot due to its advanced Natural Language Understanding (NLU) engine. It can automatically resolve over 70% of customer queries without human intervention and focuses holistically on AI customer experience. Netomi is incredibly easy to adopt and has out-of-the-box integrations with all of the leading agent desk platforms. The company works with companies providing diverse products and services across a variety of industries, including WestJet, Brex, Zinus, Singtel, Circles Life, WB Games and HP.
Lessons learnt	AI is bringing innovation in all areas of our daily business and everyday life. Take the example of Replika, it is a "virtual friend", a conversational chatbot, a companion, and it is powered by AI technology. Replika uses neutral networks to "communicate" with humans, and it learns through its conversations and interaction with users. Just like Replika, you will encounter many chatbots in every sector of our society. With the development of technology, chatbots are getting better and better everyday in adapting conversational patterns based on their interactions with users.

In the near future, or perhaps in some areas already right now, chatbots can both listen and talk based on the conversational and emotional patterns of the users. In another word, chatbots are becoming a mature partner of dialogues, and a sophisticated friend of support.

Follow up

Evaluation

Evaluation for learners:

- Do the activity Test yourself! again. Have you improved?

1. I am familiar with various examples of AI chatbots.
2. I believe AI-powered chatbots like Replika are learning through our interaction with them.
3. I can explain the benefits and the threads of using AI chatbots to communicate with customers to a friend.
4. I would like to learn more about how AI-powered chatbots are able to respond to people's questions.
5. I am open to talk with AI-powered chatbots like Replika.

As last time, choose a score between 0 - 10 for each question. 10 points, when you agree with the statement 100 percent, or 0 point, when you do not agree with this statement at all.

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What is your score now? Has your score changed? Which question has the biggest change of score? And which aspect of AI would you like to know more about?

- Take some time to reflect on the learning unit. Ask yourself:

What three aspects did you learn? Which three things do you still have questions about or want to know more about?

Compared to the motivation you had at the beginning of the session, has the learning unit fulfilled your motivation? Did you expect something different?

Is there anything missing from the unit? What are your next steps?

You can discuss these questions alone, in a group or with a trainer.
You are invited to read more about the fundamentals about AI in these briefings (link of basic briefings) and the impact of AI in other fields in these briefings (link of further briefings). And you are encouraged to extend your knowledge by using our learning platform (Link).

Evaluation for trainers:

Please evaluate the training material from a trainer's point of view.

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	• Is the learning unit well designed and explained so that it can be easily transferred into the training context? o Absolutely agree o Agree o Disagree o Totally disagree • Did the learning unit trigger discussions within the group? o Absolutely agree o Agree o Disagree o Totally disagree • Also, think about how you can develop your training based on this session and the feedback from learners. Take notes on this.
Related resources 📖	• Articles https://www.orai-robotics.com/post/ai-chatbot-for-manufacturing https://explore.wave6.com/blog/the-art-of-the-possible-manufacturing-chatbots

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ARTIFICIAL INTELLIGENCE (AI) IN TRANSPORTATION: SAFETY AND WELL-BEING

Keywords	• Artificial Intelligence • Capacity planning • Drivers' assessment • Infrastructure modelling, planning & optimisation • LUCA – Telefonica AI powered decisions • Remote Bus Performance Monitoring • Resource optimisation • Safety & well-being • Sustainability
Time (How long?)	1.5 hours
Target group (Who?)	• Trainers in professional further education, who implement learning activities in the field of AI. • Adult learners, who want to understand how AI works and can be applied in transportation.
Learning outcomes (What?)	• The activity provides an overview of what the future of artificial intelligence in transportation may be, with a focus on road transport.

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	• Learners will be able to better understand both the advantages and the disadvantages of AI in transportation, both with concrete explanations and cases of "direct" and 'indirect" usage of this technology, and the effects it has on our future daily life.
Learning outcomes (Why?) **?**	Imagine you are late for work. You are in a hurry, but stuck in the middle of a traffic jam. There is not much you can do about it. How could AI help you out in this situation? Perhaps you wouldn't even be in the traffic jam because GPS can advise another way that is maybe longer, but faster. In the future you will be able to order a taxi drone, which can take you directly to your destination in time. Sounds impossible? Uber and NASA are already working on it. Go through this unit to find out more about interesting AI transportation solutions, together with possible drawbacks..
Methodology (How?)	The learning unit can be used both in self-study individually and in small groups collectively. The learning unit follows the "learning-by-doing" approach and aims to ensure learning success through the application of practical experience reports and interactive impulses. The learning unit is divided into six components: • Test yourself! • Activity description • Case studies • Lessons learnt

	• Evaluation • Related resources In addition, trainers will also find further information (i.e. time estimated and equipment needed) to conduct the session independently.
Equipment	Whiteboard (or digital alternative like Jamboard), sheets, pens, colours, internet access as well as all learning materials printed or digital (esp. for the sections of Test yourself, Case studies, and the evaluation sheets).
Learner motivation	Please think about why you are attending this unit. Make a note of your personal motivation for learning and keep it in mind as you work through the unit. At the end of the unit, remind yourself of your initial motivation.

Implementation/learning-unit

Test yourself!	Before the learning unit starts, we ask you to test yourself! Below you will find 5 questions on the topic of AI & education.

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Please answer the questions by evaluating your current state of knowledge, capacity, and motivation. The full score of each question would be 10 points, which means you agree with the statement 100 percent. The lowest score would be 0 point, which means you do not agree with this statement at all. Feel free to choose a score that reflects your own state of mind the best.

1. I am familiar with at least three possible solutions AI can provide in transportation.
2. I believe AI can reduce traffic jams and accidents.
3. I can explain the drawbacks of the integration of AI in transportation to a friend.
4. I would like to learn more about which changes AI will bring in transportation.
5. I would gladly drive in an autonomous car, once they are proven safe.

Please summarise your points for the 5 questions.
What is your score?
Are you ready to start the lesson?

Activity description	1. Introduction of the activity. 2. Watch this video: https://www.youtube.com/watch?v=Txtj-Xp6REE 3. Form small groups and draw up a list of advantages of AI in the transportation sector. 4. Compare your results with the information from the following article: https://zesium.com/practical-use-of-a-i-in-transportation/

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	5.Discuss with all learners: Do the benefits of AI in transportation overcome the drawbacks? Explain within five statements why you think it does / it does not. 6.Read the case studies below. One case has a 'direct impact' on transportation, one case has an 'indirect impact' on transportation. 7.Find yourself in your original groups again and try to imagine the future of urban transportation: What do you think, would it be necessary to have your own car and / or a driving licence? Are you for or against it? Find five statements / pints to justify your choice. 8.Present your results to the other groups. 9.Once you finished the activity, read the following article, and compare your results with the information from the article: https://www.how-2-drive.com/self-driving-cars-need-driving-licence/
Case studies	**Case 1 – RTA uses artificial intelligence to improve bus services in Dubai** Remote Bus Performance Monitoring Centre established to track efficiency of 516 buses. "In cooperation with Alibaba Cloud, RTA (Dubai's Road and Transport Authority) has recently started trialling the 'City Brain' system to manage traffic in urban areas using artificial intelligence (AI) and advanced algorithms.

The system analyses a massive number of big data received from nol cards, operating buses and taxis as well as the Enterprise Command and Control Centre. Then it converts the data into useful information that could be used in sending instant notifications and improving bus schedules and routes. The system is expected to improve the bus ridership by 17%, average waiting time by 10 % and the journey time and the average bus usage by 5%," Al Tayer (a UAE holding company established in 1979) said.

It contributed towards reducing fuel consumption by 5% and supported the planning for periodic and preventive maintenance of buses. It also resulted in an efficiency-driven assessment of drivers, improved the road safety standards and improved the rating of customer happiness," commented Al Tayer.

Case 2 – Highways England's transport plan optimisation

Data processing and obtaining more precise insights to improve infrastructure planning in the United Kingdom. We worked closely with Highways England to obtain data from the mobile network more accurately, securely and economically. This improved data processing and more accurate insights have enabled the company to improve decision making and infrastructure planning in the UK. In the long term, their goal is the economic growth of the area and to achieve sustainable development of the environment.

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	This data, together with data collected by the road operator, provides valuable insights to instruct infrastructure modelling and planning and in simplifying processes. In order to ensure the functionality of roads, Highways England needed to collect a large amount of data. This process was arduous and costly in time and money, so the government agency recognised the need to contract LUCA to help simplify data processing. LUCA Transit responds to this need: it provides detailed information on travellers and routes, allowing infrastructure planning and transport systems to be optimised to meet real needs with maximum budgetary control. Thanks to this product, the time spent collecting data has been reduced from 6 months to 7 days, resulting in massive savings in working hours. The key result has been an annual saving of millions of pounds in data collection costs.
Lessons learnt	As you can see throughout this lesson unit, AI is improving transportation in many different ways, and it has brought radical changes in how transportation is operated in our society. AI can support us in the automation of cars, trains, ships and aeroplanes. AI can reduce accidents in transportation and make traffic flows smoother and safer. Moreover, AI is able to make transportation more efficient and more environment-friendly, which in the long run can make significant contributions to climate protection.

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There are also challenges in this regard: potential cyber-attacks, erroneous decisions and the impact on employment. It is therefore of great importance that we have a better understanding of the application of AI in transportation, so that we can have constructive discussions as a society to address these issues together.

Follow up

Evaluation	Evaluation for learners:

Do the activity Test yourself! again. Have you improved?

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Related resources	• Videos: https://www.youtube.com/watch?v=Txtj-Xp6REE • Articles: https://zesium.com/practical-use-of-a-i-in-transportation/ https://www.how-2-drive.com/self-driving-cars-need-driving-licence/

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- Cases:
https://gulfnews.com/uae/transport/video-rta-uses-artificial-intelligence-to-improve-bus-services-in-dubai-1.80875521
https://luca-d3.com/artificial-intelligence-examples/highways-england-insights

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