

Module One

What is AI?

Module One - Topic 1

Defining Artificial Intelligence

- Activity 1.1.1 - Brainstorming on imageries and representations of AI
- Activity 1.1.2 - Class questionnaire
- Activity 1.1.3 - A smart piece of paper
- Activity 1.1.4 - Finding intelligent objects

Module One - Topic 2

Interdisciplinarity of AI

- Activity 1.2.1 - Digital passport
- Activity 1.2.2 - Reverse engineering
- Activity 1.2.3 - Reflecting on AI

Module One - Topic 3

Recognizing AI

- Activity 1.3.1 - Humans vs machines
- Activity 1.3.2 - Is it AI or not?
- Activity 1.3.3 - Input Process Output

Module Description

This module introduces the basic concepts of Artificial Intelligence, starting from discussing real-world applications of AI-based technology and presenting the different domains related to AI (computer science, statistics, philosophy, etc.).

The module will explore the society of artificial intelligence, addressing, on the one hand, false myths and unrealistic expectations around AI technology through an honest and critical discussion; and, on the other hand, the challenges posed by AI to ethics, social interactions and communication. This will be achieved through class debates and activities focused on expectations and beliefs about AI, starting a critical reflection on challenges and opportunities of the new technologies.

Main subject(s): Social Science, Computer Science, Civic Education, Biology.

Time Allotment: 4 hours to complete the module

Topics and activities	
Topic 1	Defining Artificial Intelligence: Activity 1.1.1 Brainstorming on imageries of AI; Activity 1.1.2 Class questionnaire; Activity 1.1.3 A smart piece of paper; Activity 1.1.4 Finding intelligent objects
Topic 2	Interdisciplinarity of AI: Activity 1.2.1: Digital passport; Activity 1.2.2: Reverse engineering; Activity 1.2.3 Reflecting on AI
Topic 3	Recognizing AI: Activity 1.3.1 Humans vs machinesActivity; 1.3.2 Is it AI or not?, 1.3.3 Input process output
Digital competences (DigComp 2.2)	
Area 1: Information and Data Literacy - 1.1 Browsing, searching and filtering data, information and digital content Area 2: Communication and Collaboration - 2.1 Interacting through digital technologies - 2.2 Sharing through digital technologies - 2.3 Engaging citizenship through digital technologies - 2.4 Collaborating through digital technologies Area 5: Problem Solving - 5.2 Identifying needs and technological responses - 5.3 Creatively using digital technologies - 5.4 Identifying digital competence gaps	
DigCompEdu competences	
Area 1: Professional Engagement - 1.3 Reflective practice Area 2: Digital Resources - 2.1 Selecting Area 3: Teaching and Learning - 3.1 Teaching - 3.3 Collaborative learning Area 6: Facilitating Learners' Digital Competence - 6.1 Information and media literacy - 6.2 Communication	
Educational goals	
At the end of this module, a basic understanding of AI should emerge meaning that relevant domains and their roles (in history or still today) can be described. The module will provide different definitions of intelligence and rationality and participants will explore the difference between human and artificial intelligence. Furthermore, it should become clear that there are multiple views of AI based on someone's background or worldview. Finally, instances of AI in	

real life should be recognizable based on the knowledge gained throughout this module.

Throughout the activities in this module, different educational goals can be addressed. By introducing the basics of AI, self-confidence of learners can be increased while making them aware of the global challenges in the field. Furthermore, the aim is to induce critical thinking and autonomy but also dialogue and collaboration when creating a shared understanding of AI.

Module One - Topic 1

Defining Artificial Intelligence

Duration	Approximately 80 minutes (depends on the activities chosen)
Subjects	Social Science, Computer Science, Civic Education.
Summary	Defining AI is a tricky task. The concept of Artificial Intelligence is indeed a moving target, that changes over time reflecting AI development and different social frameworks. The activities in this topic will guide students through the exploration of the main concepts of AI, comparing their visions with the most common definitions of AI. Different definitions will be discussed to let students form their own view and related definition of what AI is. Moreover, it is explained how some forms of intelligence are related to AI and why AI technologies can be considered intelligent or not.

Learning objectives

In this first topic, students will learn about the origins of AI technology and the different fields that contributed to it. They will learn about the developments within the field of AI to also get an idea where we might be going with these developments in the present and future. Based on this knowledge, the students will be challenged to find their own definition of AI.

A common definition of AI will be then discussed in class - the module will refer to the UNICEF definition of AI (2021)

“AI refers to machine-based systems that can, given a set of human defined objectives, make predictions, recommendations, or decisions that influence real or virtual environments. AI systems interact with us and act on our environment, either directly or indirectly. Often, they appear to operate autonomously and can adapt their behaviour by learning about the context”

Looking also towards the next topic of disciplinarity, it is important for students to understand that next to the many definitions of AI, there are also many different views about AI. These views can be influenced by a person’s cultural or social background, which is important for students to consider when studying the topic of AI.

Advanced level

In order to revise the main concepts for the second implementation, the teacher might consider to start from the project work and make the students reflect on the topic of their project work. This process can be structured in the following steps:

1. Analyses the project work;
2. Compare the topics of the module with the project work;
3. Highlight hypothetical implementations to your project work;

4. Write a report list to deploy your project work at the end of the four module.

Activity overview

Activities	Modality	Level
Activity 1.1.1 Brainstorming on imagery of AI	In class / Online	Basic
Activity 1.1.2 Class questionnaire	In class / Online	Basic
Activity 1.1.3 A smart piece of paper	In class / Online	Basic
Activity 1.1.4 Finding intelligent objects	In class /at home (asynchronous)	Basic

Activity 1.1.1 - Brainstorming on imageries and representations of AI

Estimated duration	40 minutes
Requirements	None
Hardware and Software tools used	In class: - Pen and paper - Mentimeter (optional) - Computer for the teacher (optional) Online: - Online meeting platform - Shared document (e.g. Google Docs) - Mentimeter (optional) - Digital device for all
Type of assessment	Oral presentation
Glossary	Artificial intelligence

Procedure

1. **Anticipatory Set:** the lesson is started with a brainstorming on the definition of AI using the blackboard or digital shared boards. The teacher can also show students a small collection of headlines about artificial intelligence. Make them read a specific news article or an opinion piece and guide them through the analysis of the resource presented.

2. **Independent Practice:** the class can be divided into groups of approximately 4 students. Each group gets the task to collect information (using the internet, books, or other resources available) about what AI is and to gather popular representations of artificial intelligence in the media. Students can be asked to search for representations of AI in news, online articles, movies, tv series, books, and so on. They should write down their findings (e.g. examples of AI technologies, definitions of AI, related concepts etc.), so that they can use this information during the class discussion.
3. **Guided practice and understanding:** The teacher let the students work by themselves. Possibly establish lower and upper limits on the number of resources analysed. Then, the teacher asks students to evaluate for each resource if AI is described in a positive, negative or mixed manner. Teachers can solve doubts and give insights when prompted.
4. **Check for Understanding:** the class gets back together so that each group can shortly present their findings. This can be done through an oral presentation or each group can add their findings in a big mind map/word cloud that can be used as a reference point during the discussion (find a template for a presentation in the resource for Students). Once all groups have presented their findings, the teacher probes a discussion by asking questions (see resources for Teachers) about the different findings. For independent practice it would be possible to assign a homework in which students compare resources that have two contrasting views on the same topic in AI.
5. **Closing:** The discussion can be closed with a conclusion, e.g. a shared definition of AI (although the conclusion will most likely be that there are different definitions of AI, but that there is a set of recurring characteristics that can make a technology AI). Students might start to perceive the opinions and views behind common representation of AI.

Troubleshooting

Possible issue	Possible solution
Students take too much time to find materials / information overload	Students can be asked to focus on specific types of AI systems or applications in order to avoid information overload during their research.
More dominant students overrule the group work.	Have a sheet or document ready where everyone can add their findings without having to be the loudest speaker.
The discussion could be very chaotic or very silent.	The teacher has an important role as the discussion moderator.

Students might have difficulty in coding the resources found.

Teachers could provide a template for coding the resources in a structured manner.

Resources for students

Template for reporting imageries and representations of AI - [LINK](#)

Whiteboard for imageries on AI (BULGARIAN) - [LINK](#)

This website lists the most relevant concepts related to AI, which might be a useful starting point for students when collecting information: <https://atozofai.withgoogle.com/> (In english). This kind of resource can be useful also for teachers to create a visual representation of the different tasks/skills of the students. Teachers can stamp the card and use them on a blackboard to indicate the skill of the activity.

Resources for teachers

What is artificial intelligence and how is it used? (from European Parliament)

<https://www.europarl.europa.eu/news/en/headlines/society/20200827STO85804/what-is-artificial-intelligence-and-how-is-it-used>

Available in different languages

- BULGARIAN - <https://www.europarl.europa.eu/news/bg/headlines/society/20200827STO85804/izkustveniiat-intelekt-kakvo-predstavliava-i-kak-se-izpolzva>
- GREEK - <https://www.europarl.europa.eu/news/el/headlines/society/20200827STO85804/ti-einai-i-techniti-noimosuni-kai-pos-chrisimopieitai>
- ITALIAN - <https://www.europarl.europa.eu/news/it/headlines/society/20200827STO85804/che-cos-e-l-intelligenza-artificiale-e-come-viene-usata>
- ROMANIAN - <https://www.europarl.europa.eu/news/ro/headlines/society/20200827STO85804/ce-e-ste-inteligenta-artificiala-si-cum-este-utilizata>

A hub of MIT resources for K-12 students

- <https://raise.mit.edu/>

Anticipatory set:

- This is a A-Z guide (by Oxford Internet Institute) that offers a series of simple, bite-sized explainers to help anyone understand what AI is, how it works and how it's changing the world around us. <https://atozofai.withgoogle.com/intl/en-GB/>

Videos that can be used in class for introducing AI

Title	Description	Link	Languages
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What is artificial intelligence? The Royal Society	Introductory video on the basic concepts of AI	https://www.youtube.com/watch?v=nASDYRkbQI	ENGLISH and Autotranslated captions
How to Explain Artificial Intelligence (AI) to Kids in under 3 minutes	A quick and easy video that explains the concept of AI	https://www.youtube.com/watch?v=OPWj3cxJIHw	ENGLISH and Autotranslated captions
Artificial intelligence explained in 2 minutes: What exactly is AI?	Animated video on basic concepts of artificial intelligence (AI) and main applications	https://youtu.be/UdE-W30oOXo	ENGLISH and Autotranslated captions
Computer Scientist Explains Machine Learning in 5 Levels of Difficulty WIRED	A video that explain machine learning at 5 different levels, represented by 5 different people: a child, teen, a college student, a grad student and an expert	https://youtu.be/5q87K1WaoFI	English
What is ARTIFICIAL INTELLIGENCE? - Argo's World	Cartoon on concepts of AI	https://youtu.be/HdlppwUJOf8	Autotranslated captions
How does ARTIFICIAL INTELLIGENCE work? - Argo's World	Cartoon on how AI work	https://youtu.be/fLcZRDiQyNY	Autotranslated captions
Η Πληροφορική στο Σχολείο και στην Εκπαίδευση	YouTube channels with educational videos on AI	https://www.youtube.com/c/GerasimosPolitis	Greek

Check for understanding:

- Mentimeter is a digital tool to collectively create word clouds in the classroom:
<https://help.mentimeter.com/en/articles/410469-word-cloud>
- The following questions might help to probe a discussion in the classroom:
 - On what points do the groups agree?
 - On what points do the groups disagree?
 - What makes something “AI”?
 - How did you find the information about AI?
 - Which information sources give reliable information about AI?

Resources for teacher (in depth)

More in-depth literature:

Ouchchy, L., Coin, A., & Dubljević, V. (2020). AI in the headlines: the portrayal of the ethical issues of artificial intelligence in the media. *AI & SOCIETY*, 1-10.

Chuan, C., Tsai, W.S., & Cho, S.Y. (2019). Framing Artificial Intelligence in American Newspapers. *Proceedings of the 2019 AAAI/ACM Conference on AI, Ethics, and Society*.

The Royal Society's "Portrayals and perceptions of AI and why they matter":

<https://royalsociety.org/-/media/policy/projects/ai-narratives/AI-narratives-workshop-findings.pdf>

Links to websites and material to explore how different cultures and religions contribute to the creation and sharing of specific visions of AI

AI narratives from different cultures:

- <https://www.ainarratives.com/>

AI and faith:

- <https://aiandfaith.org/>
- <https://religiousfreedomandbusiness.org/faith-belief-ai>

AI as a religion:

- Controversial case study of Anthony Levandowski who took AI as the starting point for his religion "Way of the Future", which has been closed now
<https://www.wired.com/story/anthony-levandowski-artificial-intelligence-religion/>
<https://techcrunch.com/2021/02/18/anthony-levandowski-closes-his-church-of-ai/>

Activity 1.1.2 - Class questionnaire

Estimated duration	40 minutes
Requirements	None
Hardware and Software tools used	In class: - Kahoot - Computer for the teacher - Smartphone for each student Online: - Kahoot - Online meeting platform - Digital device for all
Type of assessment	Closed questions (multiple choice) / Oral discussion
Glossary	Artificial intelligence, Robots

Procedure

1. **[Optional] Pre survey:** before doing this activity, teachers can send the questionnaire (see resource for Teacher) to their students in order to collect some information on their belief and ideas about AI. Some of the questions will be also discussed in class. If teachers use groups' methodology this point is essential.
2. **Guided practice:** the teacher opens a Kahoot quiz (see resources for Teachers) and shares their screen with the students. The teacher then shares the pin code of the quiz with the students and waits for them to enter the quiz. Next, the teacher starts the quiz and the fun begins. Students answer a set of questions about AI. Answering the question correctly and fast increases the number of points a student can gain. At the end of the quiz, the winner is announced and rewarded with their prize.
3. **Check for understanding:** in between questions, the teacher can discuss results (especially if the answers are very mixed) to gain an understanding of why students believe certain answers to be correct. This can also be used as an opportunity to clear up misunderstandings.
4. **Closing:** to close the lesson, a short discussion can be held on what the students have learned from the quiz, e.g. by asking them what the most unexpected answer was that they have seen. Moreover, it can be discussed why it is important to know the answers to today's quiz questions.

Troubleshooting

Possible issue	Possible solution
Not every student might have a personal smartphone to participate.	For the In class modality, an 'unplugged' version could be made, e.g. giving each student a coloured piece of paper related to the answer options which they need to hold up to answer the questions.
A lagging internet connection might lead to people dropping out of the game.	For the In class modality, an 'unplugged' version could be made, e.g. giving each student a coloured piece of paper related to the answer options which they need to hold up to answer the questions.

Resources for teachers

Guided practice:

- Link to pre-activity student questionnaire
 - https://docs.google.com/document/d/1lHz62ryWClutrg43dZ8JZS7bAD1OUrUt0Y5zMlngCes/edit?usp=drive_web&oid=103492945504135362084
- Link to the Kahoot quiz
 - <https://create.kahoot.it/share/class-quiz-on-ai/0c2b652c-1ad7-4bb8-99fe-ac64a336ff4d> (ENGLISH)
 - <https://create.kahoot.it/details/44022769-b19e-4332-9a1c-48eb8de19f21> (BULGARIAN)
 - <https://create.kahoot.it/details/3fc7cbfb-7e11-4fc4-b38c-b4821bf7f43e> (GREEK)

Activity 1.1.3 - A smart piece of paper

Estimated duration	40 minutes
Requirements	None
Hardware and Software tools used	- Whiteboard + markers - Copy of “the intelligent paper”
Type of assessment	Experiment
Glossary	Algorithm, Machine learning

Procedure

1. **Anticipatory set:** the teacher introduces to the class a piece of paper, claiming that it's more intelligent than any human being and asks students if they believe this. A short discussion can be held about what can make a piece of paper intelligent, what intelligence means, if it is the same thing as knowledge, etc. Whenever a student asks why the piece of paper is more intelligent than people, the teachers should point out that it can't lose the tic tac toe game and propose to give a demonstration.
2. **Guided practice:** the teacher explains the simple rules of the tic-tac-toe game to the students (if needed) and draws a big tic-tac-toe board visible for everyone to see. The teacher then picks 2 volunteers from the students. The first volunteer will play the game on their own while the second volunteer follows the rules of the piece of paper. The person playing according to the rules of the piece of paper should read the written instructions out loud so that everyone can follow. The rest of the students might help the first volunteer during their moves. A detailed description of the steps to follow can be found in the document linked under resources for Teachers. The game might be repeated a few times with new volunteers to prove that the piece of paper will never lose the game.
3. **Direct instruction:** after the game has been played a few times, the teacher can ask the students again whether they believe the piece of paper to be intelligent. A short discussion could follow on the “why”. Now the teacher can explain how the instructions for the piece of paper were written by a programmer as part of an algorithm. This can be followed by an explanation of the main function of an algorithm, highlighting that AI systems use algorithms to function.

4. **Closing:** after having been introduced to the concept of algorithms, a final discussion could be held about who is the intelligent agent: the programmer who writes the program or the machine following the program? (or neither or both).
5. **Follow-up:** this activity could be a good opportunity to tell the story of chess world champion Kasparov vs. chess computer Deep Blue (as one, non-exhaustive example of human intelligence vs AI)

Troubleshooting

Possible issue	Possible solution
For the purpose of the activity it would be best to have the paper win.	It is suggested to pick maybe not the most keen-to-win student for the demonstration.
The student might give up when they think they can no longer win.	It would be good to encourage the student to continue as the paper might still mess up.
It's not possible to print the instructions on the piece of paper.	Instructions can be handwritten.

Resources for teachers

General:

- Template tha can be used in class
https://docs.google.com/document/d/1ip43fR633MBFngt7T_zGWdzdXFV_h07t24VuN0hO-Og/
https://docs.google.com/document/d/16bb_dOvHXBkaklkMyaqKNHO_EKfRwUfO96YpJQXL5s (ITALIAN)
- Detailed outline of the activity in English:
<https://classic.csunplugged.org/documents/activities/community-activities/artificial-intelligence/intelligentpaper.pdf>
- Detailed outline of the activity in Greek:
https://classic.csunplugged.org/wp-content/uploads/2014/12/intelligent-piece-of-paper-el_v6.pdf

Follow-up

This activity could be a good opportunity to tell the story of chess world champion Kasparov vs chess computer Deep Blue (as one, non-exhaustive example of human intelligence vs AI)

- [https://en.wikipedia.org/wiki/Deep_Blue_\(chess_computer\)](https://en.wikipedia.org/wiki/Deep_Blue_(chess_computer))
- <https://theconversation.com/twenty-years-on-from-deep-blue-vs-kasparov-how-a-chess-match-started-the-big-data-revolution-76882>
- <https://www.news247.gr/sunday-edition/kasparof-vs-deep-blue-otan-i-michani-kerdis-ton-anthro.9521716.html> (GREEK article)

Activity 1.1.4 - Finding intelligent objects

Estimated duration	40 minutes (asynchronous / at-home activity)
Requirements	Finishing topic 1
Hardware and Software tools used	In class: - None Online: - Online meeting platform - Digital device for all
Type of assessment	Oral presentation

Procedure

1. **Anticipatory set:** the teacher claims to the students that he believes they all have an intelligent object in their house, but that they need to prove it to the teacher.
2. **Independent practice:** the teacher asks every student to find a maximum of 3 objects around them which they believe to be intelligent. After 10 minutes, the students are divided into groups of approximately 4 students to discuss together which one of the collected objects they believe to be the best example of an intelligent object. They get 15 minutes to discuss and decide the final object.
3. **Check for understanding:** each group gets to present their intelligent object to the rest of the class and explain why this particular object is intelligent. Based on these presentations, the teacher can question the students to see if they understand what intelligence is and what characteristics of intelligence are.
4. **Closing:** as a closing of the activity, a short reflective discussion can be held in which the teacher and the students try to figure out what intelligence has to do with AI (e.g. are some of the intelligent objects presented an example of AI? Does a technology have to be intelligent to be considered as AI?)

Troubleshooting

Possible issue	Possible solution
In a school environment there might not be 3 or even 1 object to find per student.	Students could maybe start in groups directly to find one object per group (or they can search online for 3 objects); or students could be asked before this lesson to bring these objects from home.

Module One - Topic 2

Interdisciplinarity of AI

Duration	Approximately 80 minutes
Subjects	Social Science, Civic Education, etc.
Summary	Even though AI might seem like a very technical field to many, there is a high level of interdisciplinarity in this field. Next to the technical basis, there are concerns about the ethical implications of AI and how to make such technologies applicable in people's daily lives.

Learning objectives

Students will learn about the different disciplines that are involved in the field of AI. Furthermore, they will learn why it is important to maintain this interdisciplinarity and how it can help AI to develop into a technology that can be a successful part of our daily lives. In the second activity students will start to explore the implications of AI technology in the society.

Advanced level

More advanced activities can be presented for better understanding the inputs and outputs of AI systems. For example using the card activity presented in the activity 1.3.3 "Input and output"

Teachers might consider to repeat the activities of these modules and evaluate how students recall and use concepts that discovered in other Modules. Moreover, the digital passport can be implemented to support students in reflecting on their own learning.

Activity overview

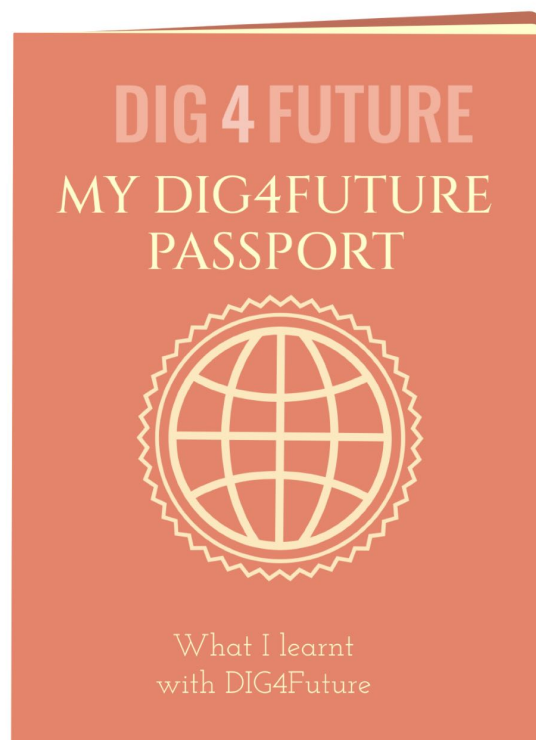
Activities	Modality	Level
Activity 1.2.1 Digital passport	In class	Basic
Activity 1.2.2 Reverse engineering	In class	Intermediated
Activity 1.2.3 Reflecting on AI	In class	Basic

For the learning objectives of this topic, it is more useful to create and involve a defined group in the class (see also the Guidelines for project's trainers and operators).

Activity 1.2.1 - Digital Passport

Estimated duration	15 - 30 minutes
Requirements	Module 1 - 2 - 3
Hardware and Software tools used	• Pen and paper or in alternative a digital device, such as smartphone, tablet or laptops • Printer (if available)
Type of assessment	Oral, class participation

The objective of this activity is to make students assess their own understanding and acquisition of skills as Digital Citizens. The activity will serve as a proof of content acquisition for both students and teachers. The passport is intended as a statement of students' knowledge of the digital world.



Procedure

Anticipatory Set:

The teacher will give to the students the “Passport of the Digital Citizens”. The passport will resemble in everything a normal passport (can be made of paper or a digital template, see Resources for Teachers). The cover will state “Dig4future Passport” and each additional page will represent the topics covered during the different modules, with references to the competences included in the DigComp. The “stamps” applicable to each page will represent the digital ability/competence possessed by the student. The teacher will explain the double nature of the Dig4future passport: a) it is a “certificate” of what they have learned throughout the modules; b) it is a tangible reminder of what they should always keep in mind when using digital technologies, interacting with AI tools, and sharing information online.



Direct Instruction

- The teacher will show the class the “Digital Passport” and will navigate through its pages together with the students.
- The teacher will explain that each stamp the students have to earn, represents their ability
- Students should be able to recognize and assess their own skills, competences and abilities as Digital Citizens

Guided Practice

- The teacher goes through each heading: there is a page for each Topic with a short summary of the learned abilities

- The teacher should trigger a discussion and make sure that all students participate

Check for Understanding

- The teacher should encourage students to elaborate more on each topic, going beyond the mere definition to delve into the opportunities and difficulties they attach to a specific topic.
- Students should be able to picture each topic in its complexity and relate this complexity to their own daily experiences

Independent Practice

- Students should be given full autonomy to choose which ability or competence to stamp on their own Digital Passport.
- Students should add notes concerning best practices, good intentions to put into actions, and warnings to suspend harmful or dangerous behaviors they used to carry on

Closing

- The teacher should remind students that the Digital Passport is not static, since the skills, competences and attentions that everyone of us should have (and is increasingly required to have) is not acquired once-and-for-all.
- Students should be aware that being a Digital Citizen is a life-learning process that embraces (almost) all the spheres of their on-line and off-line lives.
- The teacher should encourage students to imagine possible skills they would need in a more AI-integrated world
- The teacher should remind the students to complete their passport after each activity or module

Resources for teachers

Template for the DIG4future passport

https://docs.google.com/presentation/d/18IOTalXe_7clACGfdS1GfdubkQ_pRO48a_5GGrJBPFM/edit#slide=id.g88b7b50d4b_1_346

Resources

- Are you a good “digital citizen”?
https://beinternetawesome.withgoogle.com/en_us
- Digital Natives, Citizens of a changing world,
<https://net-ref.com/white-paper-fostering-digital-citizenship-in-the-classroom/>
- Know your social media rights
<https://safelab.medium.com/know-your-social-media-rights-7e87a6c45540>

- Digital footprints and digital citizenship
<https://www.pghschools.org/digitalcitizenship>
- Digital Etiquette for being a good digital citizen
<https://www.goguardian.com/blog/technology/tips-to-be-a-good-digital-citizen/>
- Net Cetera, chatting with kids about being on line
<https://www.goguardian.com/blog/technology/tips-to-be-a-good-digital-citizen/>
- Connect safely, a parent's guide to cybersecurity
<https://www.connectsafely.org/wp-content/uploads/securityguide.pdf>
- Mossberger, Karen; Tolbert, Caroline J.; McNeal, Ramona S. (October 2007). Digital Citizenship, The Internet, Society & Participation. MIT Press.
- [Promise and Problems of E-Democracy: Challenges of Online Citizen Engagement \(PDF\)](#). Paris: OECD. 2003. p. 162. ISBN 9264019480.
- [Ohler, Jason B. \(2010-08-31\). Digital Community, Digital Citizen. SAGE Publications.](#)
- Micheli, Marina (June 2018). "Digital Footprints: An Emerging Dimension of Digital Inequality". Journal of Information Communication and Ethics in Society: 7.

Activity 1.2.2 - Reverse engineering

Estimated duration	40 Minutes
Requirements	none
Hardware and Software tools used	- computer or tablet with Internet connection - post-it

Procedure

1. The teacher chooses a famous AI-based device (e.g. Alexa, a smartwatch, etc. - AI devices can be also identified by the ones from activity 1.1.4 “Finding intelligent objects”)
2. Students are divided into small groups (4-8 students)
3. Students discuss together how the device work answering questions such as:
 - How does the device work?
 - Why should you use it?
 - What might be inside the device to make it work this way?
4. Each group has to find out all the different expertises (and related experts) necessary to develop that device (e.g. designer, mathematician, mechanical engineer, etc.)
5. Each group has to try to put in sequence - following the steps of the design process - the listed expertises
6. Each group prepares a presentation (slides)

Troubleshooting

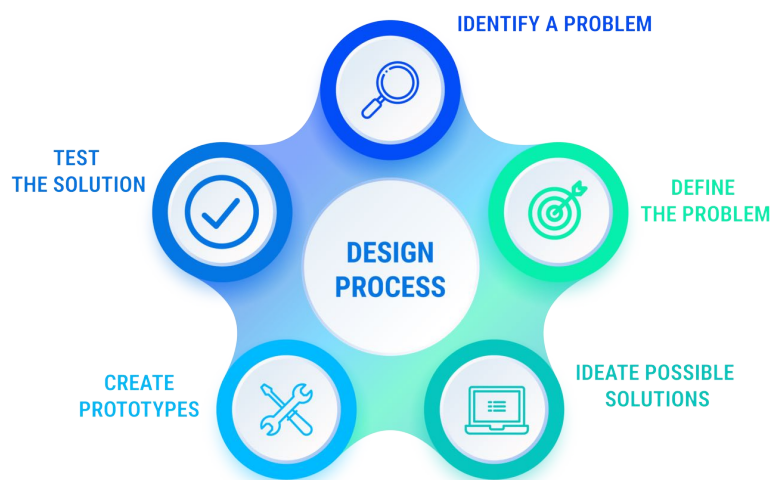
Possible issue	Possible solution
Students do not have any idea about the stages in the design process	Teacher gives each group an illustration (an image) with the stages in the design process (see Resources); students have to elaborate by themselves the meaning of each step
Students do not have any idea about the use of the proposed device	Teacher organises a short presentation to be given before the activity in groups, to show students the device, without inserting any information about the design process

Resources for teachers

- A scientific paper on Interdisciplinarity of AI: [Kusters, Remy, Dusan Misevic, Hugues Berry, Antoine Cully, Yann Le Cunff, Loic Dandoy, Natalia Díaz-Rodríguez et al. "Interdisciplinary Research in Artificial Intelligence: Challenges and Opportunities." *Frontiers in Big Data* 3 \(2020\): 45.](#)
- Definition of the stages in the design process
<https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process>

Resources for students

Graph of the design process



Activity 1.2.3 - Reflecting on AI

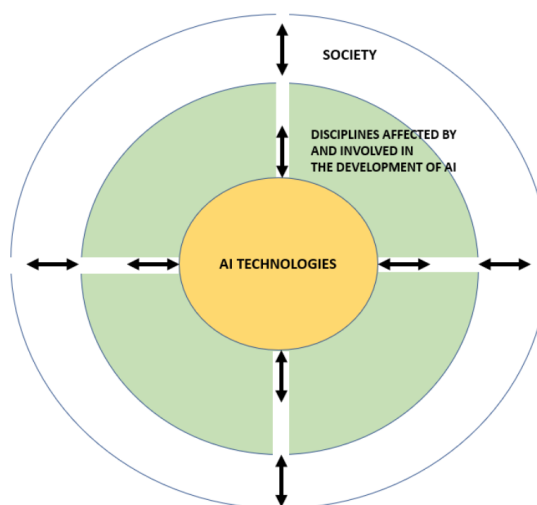
Estimated duration	40 minutes
Requirements	none
Hardware and Software tools used	Computer + projector

Procedure

1. Each group presents their slides (from the previous activity) to the other groups
2. The teacher will then lead a full class discussion on the implications of such technology
3. The teacher can ask probing questions and try to initiate a class discussion in which the other students respond to questions, and ask their own. Questions could include:
 - What data is used in this technology as the input?
 - How does this technology affect the behaviour of a single individual?
 - How does this technology affect the behaviour of groups of people?
 - Is this technology used in the same way by different people (for example people with different ages, interests, etc.)?
 - What could be some good implications of this technology? And what could be some negative ones?
 - How does this technology impact business, economy or certain jobs?

Resources for students

Students/teacher can use this diagram to support the class discussion



Resources for teachers

- A podcast (also transcribed on the linked webpage) discussing the importance of interdisciplinarity in AI, the different skills needed in the field, the importance of ethics and the role of education for an interdisciplinary approach:
<https://www.ibm.com/blogs/watson/2019/04/fuzzy-or-techie-why-ai-needs-more-interdisciplinary-thinkers/>
- More activities and resources on the implications of AI technology are presented in “Module 3 - The AI World”

Module One - Topic 3

Recognizing AI

Duration	Approximately 80 minutes
Subjects	Social Science, Computer Science, Civic Education.
Summary	The final topic focuses on the recognition of AI technologies in daily life, e.g. when shopping online or browsing through social media. Being aware of AI around them, students will be able to visualize the more technical explanations of the second module in these identified instances of AI in their lives.

Learning objectives

Students are almost at the end of this module and they have learned about different views of AI and its definition as well as relevant disciplines in the field of AI. For this final topic, they will learn how to recognize AI technologies in the world around them.

Advanced level

Students can also repeat activities on this topic (for example using different videos for the activity “Human vs machines”) and the teachers can use the document created as assignment for . Students can be also asked to explore from their books, comic books, movies or TV shows for finding how differences between humans and machines are reported and if they are based on reality or not.

Activity overview

Activities	Modality	Level
Activity 1.3.1 - Humans vs machines	In class	Basic
Activity 1.3.2 - Is it AI or not?	In class	Intermediate
Activity 1.3.3 - Input Process Output	In class / Online	Advanced

Activity 1.3.1 - Humans vs machines

Estimated duration	40 minutes
Requirements	Finish topic 1
Hardware and Software tools used	In class: - Computer for the teacher - Pen and paper Online: - Online meeting platform - Digital device for all - Word processor
Type of assessment	Written contribution

Procedure

1. **Anticipatory set:** the teacher can show a short clip highlighting the interactions and differences between humans and machines, for example the trailer of the movie Her (see resources for Teachers).
2. **Guided practice:** the teacher shows a set of Youtube videos (see resources for Teachers) that illustrate different machines that have been designed to do activities that humans normally do. After each video the class can discuss shortly whether the machine does it better or if humans would do it better.
3. **Independent practice:** the students are now asked to grab pen and paper and create two columns on their piece of paper. In the first column they are asked to write down some tasks in which computers are more efficient than humans, whereas in the second column they are asked to write down tasks in which humans are better than computers. These lists are discussed in class to get an idea of what makes a human intelligent and capable vs a machine.
4. **Direct instruction:** after the categorization from the independent practice, it would be good for the teacher to give a short explanation of what machines are currently better at, how their strength can be used for good and why we still need humans for other skills.
5. **Closing:** to close the activity, a short reflection can be done on what the students have learned during the activity discussing the rationality that characterises human behaviour and problem solving compared to that of machines. Students will reflect on

the fact that humans (instead of machines) do not necessarily choose by considering the best cost-benefit ratio, but by taking into account cultural and normative variables such as interests and values.

Troubleshooting

Possible issue	Possible solution
Students might not be able to understand an English movie trailer.	A trailer could be used from a local movie or one with subtitles in the mother tongue of the students.

Resources for teachers

Anticipatory set:

- Link to the trailer of the movie Her (in English):
<https://www.youtube.com/watch?v=WzV6mXIOVI4>
- Class discussion on rational choices and their consequences: for instance, provide the example of GPS and driving directions systems (such as Google Maps or Waze). Such systems give indications to the driver on the optimal route for reaching the destination using AI algorithms that consider different variables such as traffic conditions and past information on the traffic on the route and estimate the travel time (here an [article](#) for more information). The GPS provides a rational choice for reaching the destination but is it always the best choice? What if the driver wants to reach the destination using a panoramic route? Is it always the best option to provide or use what can be called the most rational option?

Guided practice:

Below a set of videos are listed that can be used. They are mostly in English but often the audio is less relevant to get an idea of what the machine can do.

- Video of a sudoku solving machine: <https://www.youtube.com/watch?v=Mp8Y2yjV4fU>
- Video of a pancake machine: <https://www.youtube.com/watch?v=xYA2d35e-w8>
- Video of a walking robot: <https://www.youtube.com/watch?v=aR5Z6AoMh6U>
- Video of a robot arm that can catch objects:
<https://www.youtube.com/watch?v=M413lLWvrbI>
- Video of a self-driving car: <https://www.youtube.com/watch?v=TsaES--OTzM>

This website includes also some online activities (only in English) on the role of AI
<https://www.mckinsey.com/featured-insights/mckinsey-for-kids/game-on-why-your-computer-earns-faster-and-games-better-than-you-think>

Activity 1.3.2 - Is it AI or not?

Estimated duration	15 minutes
Requirements	Finishing the previous topics of this module
Hardware and Software tools used	- Computer for the teacher - Scratch (web-based) - Kahoot / Google form (web-based) - Prepared set of cards (in case of independent practice)
Type of assessment	Multiple choice

Procedure

- **Anticipatory set:** the teacher can use a flowchart or a scratch program (see resources for Teachers) to demonstrate how one can identify whether something is AI or not. This short demonstration can be used to introduce the activity of today.
- **Independent practice:** students are divided into groups. Each group gets a deck of cards describing different technologies. The students have to categorize the cards into “AI” and “Not AI” (an “Unsure” category may also be added). For the cards in the category “AI” students can further categorize those, e.g. based on the type of AI or how it can help humans. The same activity can be also done with Kahoot or Google form.
- **Guided practice:** the activity described for independent practice can also be organized as guided practice. In that case, different parts of the classroom can be assigned as certain categories. When the teacher mentions a technology, students are asked to walk towards the part of the room that they believe to match the category of the technology.
- **Online Kahoot:** teacher can also use the kahoot (see resource for Teachers)
- **Check for understanding:** whether this activity is done as an independent or guided practice, it is important to keep asking students “why?”. This can help them to understand what characterizes an AI technology and how they can recognize it in the future.
- **Closing:** the activity can be closed with a short reflection on what the students have learned and why it is important for them to be able to recognize AI technology in their daily lives.

Troubleshooting

Possible issue	Possible solution
The activity might be too short or not engaging	Different decks of cards with different technology can be made that are exchanged between groups so that they can repeat the activity with new input.

Resources for teachers

Anticipatory set:

- Flowchart
<https://drive.google.com/file/d/1kULr8kfd0ICDftW7DiJeVHypsQ13T2CU/view?usp=sharing>
based on the article “What is AI? We drew you a flowchart to work it out” by Karen Hao
Link to the article:
<https://www.technologyreview.com/s/612404/is-this-ai-we-drew-you-a-flowchart-to-work-it-out/>
- The scratch program to use for demonstration can be found here:
<https://scratch.mit.edu/projects/371119352/>
<https://scratch.mit.edu/projects/612119810> (GREEK Version)

Independent practice:

- List of possible technology to test
https://docs.google.com/document/d/113RICQhSaNKReVY8_SdkwSm3JjQTVNkQLiyQ8YG8F6M/edit
- A detailed description of the activity (including examples of technologies to use) can be found in step 3 here:
<https://www.digitaltechnologieshub.edu.au/teachers/lesson-ideas/ai-lesson-plans/reconising-ai>

Online Kahoot:

- Online kahoot with questions for the activity (in english)
<https://create.kahoot.it/share/ai-or-not/14b41d9b-6c0c-45c9-adf5-d4fcf53cc668>
<https://create.kahoot.it/details/90e6ec53-97df-4c26-9527-dbd9ea6e0899>
(BULGARIAN)
<https://create.kahoot.it/details/db88ffce-8df5-427e-8bca-e3ce6a284dd6> (GREEK)

Activity 1.3.3 - Input process output

Estimated duration	60 minutes
Requirements	Finishing the previous topics of this module - advanced activity
Hardware and Software tools used	- Computer for the teacher - Scratch (web-based) - Prepared set of cards (in case of independent practice)
Type of assessment	Multiple choice

This activity ask students to identify and reflect on the data elaboratino process that occu in AI based systems. Starting from a concrete example, students need to identify the input, the AI process and the corresponding output.

Procedure

- **Anticipatory set:** the teacher download and print the Input, process and output cards (see Resources for Teachers) in multiple copies or use a digital version. The Scratch version of the game can also be used.
- **Independent practice:** the cards could be provided to students in small groups to sort on a large table. Alternatively, each student gets one card, either an input, process, output or an AI application card. Students mingle around the room looking for the three other students who have cards that are a match. A benefit of this is that fewer cards need to be printed; however, students don't get to sort all cards.
- **Guided practice:** tWhen all the cards have been matched, students share their groupings as a class. A teacher answer sheet is also available in the resources.

Troubleshooting

Possible issue	Possible solution
The activity might be too short or not engaging	Different decks of cards with different technology can be made, also by students themselves.

Resources for teachers

- This activity is described here (see Step 4):
<https://www.digitaltechnologieshub.edu.au/teach-and-assess/classroom-resources/lesson-ideas/recognising-ai/#>
- Card game (in English) to match correct input-process-output for the AI system shown on the card.
https://www.digitaltechnologieshub.edu.au/media/1l0fhcxp/recognising-ai_cards-input-process-output.pdf

and the teacher answer sheet
https://www.digitaltechnologieshub.edu.au/media/sxzi5hgt/recognising-ai_cards-answer-page-input-process-output.pdf
- Editable version of the cards (that can be translated)
<https://docs.google.com/presentation/d/1GuebAYlwnlqkZDcyHtYMqYpyb-fi3RVibcF7CF9XUjl/edit#slide=id.p>
- Scratch game version (in English) of the previous resource
<https://scratch.mit.edu/projects/375028792>

Assessment

Throughout the module, different activities can be chosen which each have their own form of assessment (if any). This can range from an oral presentation to multiple choice test questions in a quiz.

At the end of each lesson (which can include one or more activities) during the module, the teacher can ask for a personal deeper reflection on what students have learned thanks to the activity done. The reflection can be made in written or oral form, depending on the teacher's preference. Providing this assessment immediately after the end of a lesson will help students to remember the activity that they have just done, without having to wait for the end of the module.

At the end of the entire module, the teacher can use the following indicators to evaluate the student learning objectives:

DigComp 2.2. area	Definition	Assessment Indicators	Details
1.2 EVALUATING DATA, INFORMATION AND DIGITAL CONTENT	<i>Aware that AI is a constantly-evolving field, whose development and impact is still very unclear</i>	What is Ai? (basic definition)	Student refer the Unesco definition of Ai (2021) “AI refers to machine-based systems that can, given a set of human defined objectives, make predictions, recommendations, or decisions that influence real or virtual environments. Ai systems interact with us and act on our environment, either directly or indirectly. Often, they appear to operate autonomously and can adapt their behaviour by learning about the context”

5.2 IDENTIFYING NEEDS AND TECHNOLOGICAL RESPONSES	<i>Able to identify some examples of AI systems: product recommenders (e.g. on online shopping sites), voice recognition (e.g. by virtual assistants), image recognition (e.g. for detecting tumors in x-rays) and facial recognition (e.g. in surveillance systems).</i>	Which service or product uses AI?	Student clearly shows almost two different kinds of AI services by himself or with his group.
5.1 SOLVING TECHNICAL PROBLEMS	<i>Aware that AI is a product of human intelligence and decision-making (i.e. humans choose, clean and encode the data, they design the algorithms, train the models, and curate and apply human values to the outputs) and therefore does not exist independently of humans.</i>	What are the elements of an AI system? (advanced) Can AI exist without humans?	Student explains clearly an AI system by himself or with his group. (advanced) Student explain the relationship between humans and AI machine
2.3 (advanced)	<i>Knows that AI per se is neither good nor bad. What determines whether the outcomes of an AI system are positive or negative for society are how the AI system is designed and used by whom and for what purpose.</i>	What is the human role in the design process of an AI machine? (advanced) When and why the design process of an AI can fail and create bad consequences?	Students explain clearly the role of humans in a design process with at least one example. (advanced) Student speaks about at least one example of bad project design of an AI. Student shows to have understood and have awareness of the role of the humans on AI's behaviour

At the end of the entire module, the teacher will make a brief sum up of the activities and the main concepts addressed during the lessons of the module, in order to help the students to quickly review the contents. Teachers can also print and exhibit in the classroom the cards from The AZ of AI from Google website together with the students. After being able to ask clarification questions, students will perform a multiple choices question test and they will answer a short open question. This last format aims to let students express a personal thought, as well as a creative idea, concerned with the contents of the module. ■ ■ ■