Module Three
The AI world

Module Description	
The module focuses on human - AI interactions. It covers applications of AI and machine learning that are already on the market (e.g. computer vision applications, web-search engines) or that will be available in the near future (e.g. autonomous vehicles, humanoid robots). The activities will focus on a critical and honest discussion on what can be achieved thanks to AI and machine learning, what remains far from achievable in the field, and on the fact that AI can impact society in positive and negative ways. Students attending this module will reflect on the advantages and limits of such technology, reflecting on aspects such as privacy and biases in human - AI interactions raised by such technology. Teachers will be able to engage learners in activities and discussions involving responsible use of digital technologies.	
Main subject(s): Computer science, ethics, social science, civic education	
Time allotment: 4 hours to complete the module	
Topics and activities	
Topic 3.1	**Real-world applications of AI**: Activity 3.1.1 AI for good: The (potential) positive

	impact of AI technologies on social life and global issues; Activity 3.1.2 Main societal challenges and risks in the use of AI; Activity 3.1.3 Co-design fictions
Topic 3.2	**Ethical implications of AI:** Activity 3.2.1 Creating Ethical Matrices; Activity 3.2.2 Scenario Discussion; Activity 3.2.3 Class Code of Conduct

Digital competences (DigComp 2.1)

Area 2 Communication and collaboration
- 2.2 Sharing through digital technologies
- 2.3 Engaging in citizenship through digital technologies
- 2.4 Collaborating through digital technologies

Area 3 Digital content creation
- 3.1 Developing digital content
- 3.2 Integrating and re-elaborating digital content
- 3.4 Programming

Area 4 Safety:
- 4.1 Protecting devices
- 4.2 Protecting personal data and privacy
- 4.4 Protecting the environment

DigCompEdu competences

Area 5 - Empowering learners:
- 5.1 Accessibility and inclusion: To ensure accessibility to learning resources and activities, for all learners, including those with special needs. To consider and respond to learners' (digital) expectations, abilities, uses and misconceptions, as well as contextual, physical or cognitive constraints to their use of digital technologies.
- 5.3 Actively engaging learners To use digital technologies to foster learners' active and creative engagement with a subject matter. To use digital technologies within pedagogic strategies that foster learners' transversal skills, deep thinking and creative expression. To open up learning to new, real-world contexts, which involve learners themselves in hands-on activities, scientific investigation or complex problem solving, or in other ways increase learners' active involvement in complex subject matters.

Educational goals

The Module is intended to contribute to a critical understanding of the challenges associated with person-AI interaction. Starting from a knowledge of the current stage of development of AI and of the foreseeable one in the medium term, students will develop a more conscious vision of the functioning of AI-based tools and of the cultural biases that affect it. Moreover, students will be able to formulate hypotheses with respect to the positive and negative impacts that the adoption of AI-based tools can generate at the social level and to argue their

opinion with respect to ethical dilemmas.

Module Three - Topic 1

Real-world applications of AI

Duration	Approximately 120 minutes
Subjects	Social Science, Computer Science, Civic Education, Ethics
Summary	This topic is based on the idea that AI applications in the real world can have positive and negative effects. Students will be encouraged to discuss opportunities and challenges brought about by existing applications of AI technologies. They will also explore possible current or future developments in the use of AI technologies in the real world through a creative exercise.

Learning objectives

The aim of this Topic is to increase students' awareness of AI technologies' applications in the real world and their implications. The activities will highlight risks and opportunities through the analysis of examples from different societal areas such as climate change, finance and economics, healthcare etc., maintaining and fostering an interdisciplinary approach. They will also help familiarise students with key concerns regarding the use of AI technologies and surveillance, biases and privacy issues.

Activities overview

Activities	Modality	Level
Activity 3.1.1 AI for good: The (potential) positive impact of AI technologies on social life and global issues	Inclass / Online	Basic
Activity 3.1.2. Main societal challenges and risks in the use of AI	Inclass / Online	Basic
Activity 3.1.3 Co-Design Fictions	Inclass / Online	Intermediate

Activity 3.1.1 - AI for good: The (potential) positive impact of AI technologies on social life and global issues

Estimated duration	40 minutes
Requirements	Modules 1 and 2. If done in-presence, moderately large open space where students can discuss and present in groups
Hardware and Software tools used	**Remote:** Software - Video-conferencing software. Real time online collaboration text editor and presentation software. Hardware - Desktop/laptop computer
Type of assessment	Assessment is based on the understanding of the issues discussed in class displayed through a representation of arguments supporting the positive impact of AI, and through critical discussions that question those arguments.

The objective of this activity is to facilitate the understanding of how the use of AI technologies can have a positive impact on the real world through the representation of supporting arguments and examples. Comments and questions challenging these arguments will also be encouraged and explored. .

Procedure (steps)

Anticipatory Set

- Teachers can remind students of an artificial intelligence system previously studied in Module 1. Teachers introduce some examples of the positive impact of AI technologies on key real world issues (e.g. healthcare, climate change, research...) taken from the “AI for Good” list (see resources for teachers below).

Direct Instruction

- Teachers divide students in groups of 3-8 students.

- Each group of students discusses one example of “positive” AI application in the real world (AI for good). Each group thinks about the possible implications of that examples in other areas/on other key issues.

Guided Practice and Understanding

- Each group, using the material provided by the teacher, devises a way to represent the examples they are discussing to highlight the ways in which AI technologies allow for better/more effective ways to address that specific issue, and thus the arguments in favour of that application. Each student might represent an aspect, agent or functionality of the entire system.

Independent Practice

- The students in each group play out the representation of the AI application example and of the supporting arguments for the whole class (students can give oral presentations using also slides)

Closing

- The rest of the class challenge the supporting arguments through critical comments and questions. Teachers moderate the discussion and clear any misrepresentations or doubts other students might have.

Troubleshooting

Possible issue	Possible solution
The AI examples of applications of AI in the real world are unclear to the students, or students can not relate the concepts they learned previously with the applications of AI they are trying to explain.	Assurance from the teacher and re-explanation of high-level concepts if needed.
Students unwilling to physically play out an application of AI technologies in the real world	Partnering with a drama teacher and making the enacting part of the lesson in a more appropriate environment, such as a school theatre or a large space.
Students unwilling to challenge the examples and arguments presented by one group	Teacher asks questions that encourage critical debate on specific application of AI

Resources for teachers

AI for good resources:

- A list of examples of artificial intelligence applications for good
  https://www.crisscrossed.net/2018/12/19/12-inspiring-examples-of-artifical-intelligence-for-good/

- Use of AI to tackle climate change. Climate Change AI.
  https://www.climatechange.ai/about
  See also
  https://tate.it/blog/post/come-puo-lintelligenza-artificiale-limitare-gli-effetti-del-cambiamento-climatico/

- How can AI apply to agriculture? Norton Rose Fulbright.
  https://www.nortonrosefulbright.com/en-ke/knowledge/publications/6400e1ea/artificial-intelligence-and-the-future#section3

- Finn Church Aid & Solita. 2020. How Blockchain can increase trust and transparency in humanitarian aid.
  https://www.solita.fi/en/customers/how-blockchain-can-increase-trust-and-transparency-in-humanitarian-aid/

Methodological resources:

More in-depth literature describing participatory design tools:
Elizabeth B.-N. Sanders, Eva Brandt, Thomas Binder. 2010. A Framework for Organizing the Tools and Techniques of Participatory Design. Proceedings of the 11th Conference on Participatory Design. ACM, Sydney, Australia. 195–198.

On embodied pedagogy:
Nguyen, D. J., & Larson, J. B. (2015). Don't forget about the body: Exploring the curricular possibilities of embodied pedagogy. Innovative Higher Education, 40(4), 331–344.
https://doi.org/10.1007/s10755-015-9319-6
https://link.springer.com/article/10.1007/s10755-015-9319-6

On enactment effects on memory:
Madan, C. R., & Singhal, A. (2012). Using actions to enhance memory: Effects of enactment, gestures, and exercise on human memory. *Frontiers in Psychology*, *3*.
https://doi.org/10.3389/fpsyg.2012.00507
https://www.frontiersin.org/articles/10.3389/fpsyg.2012.00507/full

Resources for students

[We will add a link to an ad-hoc structures document for helping in structuring the group discussion]

Activity 3.1.2 - Main societal challenges and risks in the use of AI

Estimated duration	40 minutes
Requirements	Modules 1 and 2. Activity 3.1.1. If done in-presence, moderately large open space where students can discuss and present in groups
Hardware and Software tools used	Remote: Software - Video-conferencing software. Real time online collaboration text editor and presentation software. Hardware - Desktop/laptop computer
Type of assessment	Assessment is based on the understanding of the issues discussed in class displayed through the representation of arguments highlighting the negative impact of AI, and through critical discussions that question those arguments.

The objective of this activity is to facilitate the understanding of how the use of AI technologies can have a negative impact on the real world through the representation of supporting arguments and examples. Comments and questions challenging these arguments will also be encouraged and explored.

Procedure (steps)

Anticipatory Set

- Teachers can remind students of an artificial intelligence system previously studied. Teachers introduce some examples of negative impact and risks posed by AI technologies in the real world, e.g. algorithm bias, privacy and surveillance issues,

environmental and economic repercussions of AI-based systems... (see resources for teachers below).

Direct Instruction

- Teachers divide students in groups.
- Each group of students discusses one example of negative implications of or risks caused by AI applications in the real world.
- Each group thinks about the possible implications of that example in other areas/on other key issues

Guided Practice and Understanding

- Each group, using the material provided by the teacher, devises a way to represent the example they are discussing to highlight the ways in which AI technologies create risks and have a negative impact on the issue at stake, and thus the arguments against that application. Each student might represent an aspect, agent or functionality of the entire system.

Independent Practice

- The students in each group play out the representation of the AI application example and of the arguments against its use for the whole class.

Closing

- The rest of the class challenge the arguments against the use of AI in that particular area through critical comments and questions. Teachers moderate the discussion and clear any misrepresentations or doubts other students might have.

Troubleshooting

Possible issue	Possible solution
The AI examples of applications of AI in the real world systems are unclear to the students, or students can not relate the concepts they learned previously with the applications of AI systems they are trying to explain.	Assurance from the teacher and re-explanation of high-level concepts if needed.

Students unwilling to physically play out an application of AI technologies in the real world.	Partnering with a drama teacher and making the enacting part of the lesson in a more appropriate environment, such as a school theatre or a large space.
Students unwilling to challenge the examples and arguments presented by one group	Teacher asks questions that encourage critical debate on specific application of AI

Resources for teachers

Negative impact of AI / risks posed by AI resources:

Algorithm bias

- Amazon scraps secret AI recruiting tool that showed bias against women
- Google will pay $2.6 million to workers over claims its hiring and pay practices were biased against women and Asians
- Algorithm-driven Hiring Tools & Disability Discrimination
- Köchling, A., Wehner, M.C. Discriminated by an algorithm: a systematic review of discrimination and fairness by algorithmic decision-making in the context of HR recruitment and HR development. *Bus Res* **13,** 795–848 (2020). https://doi.org/10.1007/s40685-020-00134-w
- Wired. "Machines Taught by Photos Learn a Sexist View of Women: Algorithms showed a tendency to associate women with shopping and men with shooting".
- [in italian] Festival dei Diritti Umani 2021 - Algoritmocrazia
  "Nuove tecnologie, vecchi bias" - Educational session
  Includes resources on use of images & algorithms, digital citizenship, hate speech (also Module 4)
  https://festivaldirittiumani.it/event/nuove-tecnologie-vecchi-bias/
  See also: https://festivaldirittiumani.it/irony-di-radheya-jegatheva/
- Centre for Democracy and technology, Responsible Use of Data and Technology in Education: Community Engagement to Ensure Students and Families Are Helped, Not Hurt

Privacy issues

- Centre for Democracy and Technology, Student privacy protection Training Module
- Stoilova, Mariya; Livingstone, Sonia; Khazbak, Rana (2021). Investigating Risks and Opportunities for Children in a Digital World: A rapid review of the evidence on children's internet use and outcomes, Innocenti Discussion Papers no. 2021-01, UNICEF Office of Research - Innocenti, Florence.
  https://www.unicef-irc.org/publications/1183-investigating-risks-and-opportunities-for-children-in-a-digital-world.html

- Save the Children (2020). Digital Safeguarding For Migrating And Displaced Children: An overview of the current context and trends, potential risks and practical next steps. https://resourcecentre.savethechildren.net/node/18477/pdf/mdi_digital_final_rgb_rev_091220.pdf
- [positive example]
  https://blog.torproject.org/reaching-people-where-they-are
  Tor Project's mission is to further the popular understanding of privacy technologies → trainings in the Global South

Surveillance

- BBC File on 4 Podcast (2020). “Facial recognition is being rolled out across Britain. But is it a vital tool against crime - or a threat to the innocent?”
  https://www.bbc.co.uk/programmes/m000dpkt
- Use of facial recognition in schools:
  https://www.biometricupdate.com/201910/french-privacy-regulator-finds-facial-recognition-gates-in-schools-illegal
  https://www.politico.eu/article/french-privacy-watchdog-says-facial-recognition-trial-in-high-schools-is-illegal-privacy/
  (see also Automating Society Report 2020)
- There are two pilot projects in Sweden which focus their attention to the use of AI and facial students’ recognition for administrative purposes allowing teachers to devote their time to teaching
  https://www.electronicspecifier.com/products/artificial-intelligence/facial-recognition-tested-in-swedish-high-school
- Structural and cognitive change of schools and schooling, see Andrejevic and Selwyn, Facial Recognition technology in schools: critical questions and concerns,
  https://www.tandfonline.com/doi/full/10.1080/17439884.2020.1686014
- European Parliament recent moratorium on using facial recognition for law-enforcement purposes:
  https://www.europarl.europa.eu/news/en/press-room/20210930IPR13925/use-of-artificial-intelligence-by-the-police-meps-oppose-mass-surveillance

Environmental and economic repercussions of AI-based systems

- BBC The Documentary Podcast (2019). “Will AI kill development? Will robotisation prevent poorer countries taking the traditional route to prosperity?”
  https://www.bbc.co.uk/programmes/p075nqyy

- Sahota, Neil. “Beyond AI: The Need For Solutionists In Creating A Sustainable World”. Forbes. 24 April 2019.

https://www.forbes.com/sites/cognitiveworld/2019/04/24/beyond-a-i-the-need-for-solutionists-in-creating-a-sustainable-world/

- Jones, Phil. “Refugees help power machine learning advances at Microsoft, Facebook, and Amazon”. Restofworld. 22 September 2021. https://restofworld.org/2021/refugees-machine-learning-big-tech/
- Deutsche Welle Documentary (2021) “Invisibles – exploitation in the digital world of work” https://www.youtube.com/watch?v=o-HphMeZR3k
- Strubell et al. 2019. “Energy and Policy Considerations for Deep Learning in NLP.” Proceedings of the 57th Annual Meeting of the Association for Computational Linguistics. https://www.aclweb.org/anthology/P19-1355. DOI:10.18653/v1/P19-1355
- Schwartz et al. 2019. “Green AI.” https://arxiv.org/abs/1907.10597
- Why we should care about the environmental impact of AI https://www.forbes.com/sites/forbestechcouncil/2020/08/17/why-we-should-care-about-the-environmental-impact-of-ai/?sh=766825ef56ee

- [in Italian] Roberto Cingolani nuovo ministro della transizione ecologica. Ecco il manifesto per la sobrietà digitale che ha scritto sull’Espresso
  Il fisico neo titolare del dicastero: "Non dobbiamo rinunciare alla tecnologia. Ma è bene sapere che ogni azione digitale ha una conseguenza sull’ambiente. Un esempio? Dispositivi, server e reti producono il doppio di Co2 del traffico aereo"
  https://espresso.repubblica.it/idee/2021/02/09/news/mentre_leggi_questo_articolo_stai_inquinando_anche_tu-286796530/

Methodological resources:

More in-depth literature describing participatory design tools:
Elizabeth B.-N. Sanders, Eva Brandt, Thomas Binder. 2010. A Framework for Organizing the Tools and Techniques of Participatory Design. Proceedings of the 11th Conference on Participatory Design. ACM, Sydney, Australia. 195–198.

On embodied pedagogy:
Nguyen, D. J., & Larson, J. B. (2015). Don’t forget about the body: Exploring the curricular possibilities of embodied pedagogy. Innovative Higher Education, 40(4), 331–344. https://doi.org/10.1007/s10755-015-9319-6
https://link.springer.com/article/10.1007/s10755-015-9319-6

On enactment effects on memory:
Madan, C. R., & Singhal, A. (2012). Using actions to enhance memory: Effects of enactment, gestures, and exercise on human memory. *Frontiers in Psychology*, *3*. https://doi.org/10.3389/fpsyg.2012.00507
https://www.frontiersin.org/articles/10.3389/fpsyg.2012.00507/full

Activity 3.1.3 - Co-Design Fictions

Estimated duration	40 minutes
Requirements	Modules 1 and 2. If done in-presence, moderately large open space where students can make plays and enact.
Hardware and Software tools used	**Remote** Software - Video-conferencing software. Hardware - Desktop/laptop computer
Type of assessment	- Oral presentation in front of class. - Quality of the ideas and prototypes developed. - Open-ended questions by the teacher about the feasibility, appropriateness and impact of their proposed design. - Questions of peers and discussion after presentation.

The aim of the activity is to provoke students and raise questions about future scenarios in AI. It can also be used to facilitate discussions about the potential forms, functionality, and applications of AI technology by using fictional prompts or what-if questions. Students should be able to envision, discuss, write and design possible future AI technologies.

Procedure (steps)

Anticipatory Set

1. First, the teacher should establish the coordinates of reality, that is, present the current state of AI implementation in society, as well as larger social and cultural contexts surrounding it. Moreover, students should be presented with the concepts and technologies of AI for which they are going to create their story (eg. facial recognition).

Direct Instruction

2. The teacher presents a fictional story to elicit the exploration of ideas and designs. The story could begin with a personal experience, a news headline or an existing fiction story.

3. The story can have a "what-if" moment, or a counterfactual that elicits the creation of alternative storylines by the students.
4. Students are then prompted to design a piece of technology that answers to the context and needs of people in the fictional story created by the teacher.
5. The teacher must ask the children explicitly to not think about technological, manufacturing and skills impediments.

Guided Practice

6. The teacher divides the class in small groups to codesign
7. The students must then create a prototype for their designs, using and shaping simple materials like paper, cardboard, fabric, masking tape etc.

Check for Understanding

8. The teacher can go around the groups to check the quality of work and guarantee the discussion remains relevant. Teachers can solve doubts and give insights when prompted.

Independent Practice

9. When their design is ready, students should create a story around the prototype, describing its functioning, who uses it, for what it's used, while telling an engaging story exploring the social and ethical dilemmas their technology aims to solve.

Closing

10. Students present their prototypes to the class and have their solutions evaluated and discussed by their peers.

Troubleshooting

Possible issue	Possible solution
Lack of time for the full activity.	Make the activity a homework assignment. Split the work in different lessons.
Students get stuck on the current state of technology, or know-how when thinking about their designs.	Asking the children explicitly to not think about technological, manufacturing and skills impediments.

Students generate solutions that are seemingly magical, fantastical or irrelevant to the issues or social context discussed.	Guiding their group discussions with probing questions if students start getting lost in fantasy.
Lack of confidence of students in their design skills.	Giving reassurance that they are able to devise a design with their current abilities.

Resources for teachers

Description of the method applied to the teaching of new or emerging technologies:
https://irep.ntu.ac.uk/id/eprint/35113/1/12674_Hardy.pdf

Applying design fiction in primary schools:
https://www.tandfonline.com/doi/pdf/10.1080/14606925.2019.1594972

More in-depth literature:

1. Cheon, E., Sher, S. T. H., Sabanović, Š., & Su, N. M. (2019, June). I Beg to Differ: Soft Conflicts in Collaborative Design Using Design Fictions. In Proceedings of the 2019 on Designing Interactive Systems Conference (pp. 201-214).
2. Hardy, A. (2018). Using design fiction to teach new and emerging technologies in England. Technology and Engineering Teacher, 78(4), 16-20.
3. Maxwell, D., Pillatt, T., Edwards, L., & Newman, R. (2019). Applying design fiction in primary schools to explore environmental challenges. The Design Journal, 22(sup1), 1481-1497

Module Three - Topic 2

Ethics of AI

Duration	120 Minutes
Subjects	Social Science, Computer Science, Ethics, Civic Education
Summary	This topic focuses on the ethical implications of AI technologies in human-machine interaction. It will introduce some basic concepts in the field of ethics (accountability, respect, inclusion, equity, sustainability) and connect them with practical examples of AI applications in the real world. Students will be encouraged to reflect on the relationship between humans, machines and ethics and to develop their own guidelines on some of the issues addressed in this Module.

Learning objectives

Students should be able to analyse AI as socio-technical systems and to understand the sometimes contrasting interests of different people affected by algorithms (stakeholders). Thinking about the unequal impact of AI and its ethical implications when using or designing those systems. How algorithms affect people differently. Issues of gender and race in AI and the replication of undesired social dynamics (bias/exclusion) in algorithms. Key ethical issues surrounding AI, such as:

1. Privacy/surveillance,
2. Employment, Misinformation,
3. Singularity/concern about harm to people,
4. Ethical decision making,
5. Diversity,
6. Bias/fairness,
7. Transparency,
8. Accountability.

Activity overview

Activities	Modality	Level
Activity 3.2.1 Creating Ethical Matrices	Inclass / Online	Advanced
Activity 3.2.2 Scenario Discussion	Inclass / Online	Intermediate
Activity 3.2.3 Class Code of Ethics	Inclass / Online	Intermediate

Activity 3.2.1 - Creating Ethical Matrices

Estimated duration	40 minutes
Requirements	Modules 1 and 2.
Hardware and Software tools used	**In-presence** Large sheets of paper, and coloured pens/sticky notes. **Remote** Software - White canvas software with real time collaboration. Video-conferencing software. Hardware - Desktop/laptop computer with mouse, or tablet.
Type of assessment	Oral presentation of the matrix and discussion. Students are assessed on the quality of ideas and diversity of issues presented. Are also assessed the quality of construction and completeness of the matrix to be delivered at the end of the activity.

Procedure (steps)

Anticipatory Set

1. The teacher should introduce the idea of algorithm as an opinion (see MIT AI Ethics Education curriculum, peanut butter and jelly sandwich exercise - or equivalent), providing examples of how stakeholders' interests/opinions are reflected in the outcome.

Direct Instruction

2. Then they should explain the concepts of stakeholders, values and goals with respect to algorithms.

3. Present the ethical matrix and explain its constitution to students (using the same example, peanut butter and jelly sandwich - or equivalent, list stakeholders, values and goals involved).

4. Describe the activity objective, i.e. identifying key ethical claims, possible motivations for different stakeholders' goals and conflict/alignment between them.

Guided Practice

5. Provide a list of AI applications and make students pick their preferred, forming groups around chosen issues.

6. Present the matrix and make students create their own wireframe with large sheets of paper.

7. The teacher can fill a matrix using the example from the "anticipatory set" using students' input and posing instigating questions. This step can be used to clarify how to use the matrix, and what content should be inserted.

Check for Understanding

8. The teacher can go to each group and make students briefly discuss the ethical implications of their AI system not previously explained, asking questions about fairness, equity and so on.

Independent Practice

9. Students should list the interest groups (stakeholders) and fill the matrix based on group discussion. Devise a list of ethical principles relevant to each interest group. The teacher should be available for clarifying doubts regarding technical questions around AI. Furthermore, going through the groups to provide constructive advice and ensuring the discussion is around the relevant theme.

10. Students can then be asked to evaluate the impact of each specific principle with a scale from -2 (very negative) to +2 (very positive).

11. Optionally, students can be asked to evaluate if the principles specified in individual cells are observed or infringed, granting a positive or negative score respectively.

Closing

12. Students present to the class the completed matrix. Students can ask questions and each matrix is discussed by the whole class

Troubleshooting

Possible issue	Possible solution
Difficult in taking perspectives other than their own, or to think about conflicting perspectives of different stakeholders.	Not dividing the class in groups around different AI systems. Instead, presenting a single AI system and dividing the class in groups and making each group work out the specific perspectives of a single "stakeholder". Assembling the full matrix afterwards.
Students going astray with the discussion, discussing irrelevant issues.	Teachers can avoid students discussing irrelevant issues by enforcing a structured approach and giving timely advice.

Resources for teachers

Resources for teachers on what is an ethical matrix and how to build it:

- https://docs.google.com/document/d/1e9wx9oBg7CR0s5O7YnYHVmX7H7pnITfoDxNdrSGkp60/edit# This MIT resource for AI and Ethics education for middle school students (10-14) provides guidance to explain and build an ethical matrix, based on the concept of algorithms as opinion (connected to the concept of algorithm bias). It includes slides, teacher guide and activity sheet (in English)
- A brief guide on how to manage dialogue concerning controversial issues in the classroom: *Difficult Dialogue in the Classroom Guidance and activities to give teachers the skills to manage difficult dialogue* – Training resource from Tony Blair Institute for Global Change: https://generation.global/assets/resources/difficult-dialogue-english.pdf

More in-depth literature:

- Mepham, B., Kaiser, M., Thorstensen, E., Tomkins, S., & Millar, K. (2006). *Ethical matrix manual*. LEI, onderdeel van Wageningen UR.
- Jensen, K.K., Forsberg, EM., Gamborg, C. *et al.* Facilitating Ethical Reflection Among Scientists Using the Ethical Matrix. *Sci Eng Ethics* **17,** 425–445 (2011). https://doi.org/10.1007/s11948-010-9218-2
- Ethical Matrix Manual: https://core.ac.uk/download/pdf/29269684.pdf

Activity 3.2.2 - Scenario Discussion

Duration	40 minutes
Estimated duration	
Requirements	Modules 1 and 2.
Hardware and Software tools used	**Remote:** Software - Video-conferencing software. Real time online collaboration text editor and presentation software. Hardware - Desktop/laptop computer
Type of assessment	Quality of arguments during group discussion and class presentation.

This activity can be used to engage students in ethical considerations on the potential benefits and risks that could arise from AI and affect the social environment. For that reason the use of ethical dilemmas might be useful. The discussion may concern potential impacts of AI on the labour market, on social inequalities, on environment, natural resources and sustainability, on privacy and surveillance, on human relationships and human rights.
The teacher will take the role of the facilitator in this activity and manage the dialogue in accordance to the approach tested in activity 3.2.1.

Procedure (steps)

Anticipatory Set

1. The teacher can remind students about the most common ethical theories if not explored previously. The presentation of a well-known ethical dilemma as an example and a brief discussion coupled with some questions to students can be interesting enough to grab their attention.

Direct Instruction

2. The students should be divided into groups of four to six.

3. The teacher reads aloud a scenario, or provides to students the scenario's text (virtually or printed) so everyone reads silently.

Guided Practice and Check for Understanding

4. After the story is read the teacher should ask students how they read the situation and what might be the underlying issues or problems.

Independent Practice

5. When the group arrives at an understanding of the problem, the teacher should ask how they would approach the issue, which steps they would take, and which consequences it would entail.

6. Inside each group, students should create a list of possible approaches and share them with the class.

Closing

7. Teachers should comment on the proposals and relate the possible solutions to the equivalent ethical frameworks.

Troubleshooting

Possible issue	Possible solution
Dominant personalities in the group shifting the discussion to match their views.	Establishing turns to speak. Creation of a list of approaches instead of demanding for consensus inside the groups.
Irrelevant discussions to the scenario at-hand.	Constant verification by the teacher that the discussions are on track.
Lack of substance on their reasoning around the ethical problems presented.	Provide students with previous knowledge of ethical and moral theories to support their reasoning.

Resources for teachers

- Guide for the activity with examples and description of the facilitator role: https://schoolreforminitiative.org/doc/facilitation_scenarios.pdf
- European Parliament - The ethics of artificial intelligence: Issues and initiatives: https://www.europarl.europa.eu/RegData/etudes/STUD/2020/634452/EPRS_STU(2020)634452_EN.pdf
- Automating Society Report 2020: https://automatingsociety.algorithmwatch.org/

More in-depth literature:
Eva Brandt, Thomas Binder, Elizabeth B.-N. Sanders. Tools and Techniques: Ways to engage telling, making, enacting. In Routledge International Handbook of Participatory Design. Routledge, New York, NY. 145–181.

Activity 3.2.3 - Class Code of Ethics

Estimated duration	40 minutes
Requirements	Modules 1 and 2. Large sheets of paper, coloured pens.
Hardware and Software tools used	**Remote:** Software - Video-conferencing software. Real time online collaboration text editor and presentation software. Hardware - Desktop/laptop computer
Type of assessment	Oral presentation, groups written outcome of the activity. Quality of arguments during class discussion.

The goal of the activity is to make students think about ethical issues in an AI area of their choice and co-create a Class Code of Ethics.

Procedure (steps)

Anticipatory Set

1. First, the teacher narrates a story that explores and exposes an ethical issue underlying a particular Artificial Intelligent System. For example, the teacher could create a fictional story in which a person is unfairly treated or mistakenly portrayed based on pervasive

facial recognition software. Engage students in a small discussion about the story and its fairness/unfairness to make them start thinking about those concepts.

Direct Instruction

2. Teachers should provide students with a list of AI areas and research questions that will guide students' ethical inquiries. See *AI Ethics Research Areas* and *AI Ethics Research Reflection in* "Resources for Teachers" section.
3. The teacher should divide students into working groups.
4. Students should agree on the distribution of Artificial Intelligence areas between groups.

Guided Practice

5. Each group should think and discuss ethical issues and problems pertaining to their specific AI area. They should follow the research guidelines provided and consult the teacher when needed.
6. Each group should develop solution-oriented principles that address ethical shortcomings in their chosen area of AI.

Check for Understanding

7. The teacher can go around the groups to check the quality of work and guarantee the discussion remains relevant. Teachers can solve doubts and give insights when prompted.

Independent Practice

8. Groups get together and create a shared document with all the principles devised. Conflicting principles should be discussed with the class and contradictions solved in the final document.

Closing

9. The final document should be the Class Code of Ethics is presented to the whole class with a shared presentation, either in physical or virtual format.

Troubleshooting

Possible issue	Possible solution

Students having difficulty in reasoning about the issues and providing solution-based principles.	Providing the students the research guidelines printed or as a virtual document for reference.
Difficulty in solving or arriving at a compromise between conflicting principles in the class discussion phase.	Teacher guidance when necessary and mediation of class discussion.

Resources for teachers

- Description of the activity with steps and links for useful documents: https://curriculum.code.org/hoc/unplugged/5/
- AI Ethics Research Areas: https://docs.google.com/document/d/16D3jRO2Q3KxM8FHvC8sdGLa19sxa5DGperetnX9gqcY/edit
- AI Ethics Research Reflection: https://docs.google.com/document/d/19vF4UVAcJa6UsqkdKynWzSR80MInb2G3coBoWNxplYc/edit
- AI Code of Ethics Slides: https://docs.google.com/presentation/d/1SJEXpTCKwf5fbDy5GuDjDGAsuUrkI9QfxKF-1pMSndg/edit#slide=id.ga33378b3c1_0_47

Resources for students

- AI Ethics Research Areas: https://docs.google.com/document/d/16D3jRO2Q3KxM8FHvC8sdGLa19sxa5DGperetnX9gqcY/edit
- AI Ethics Research Reflection: https://docs.google.com/document/d/19vF4UVAcJa6UsqkdKynWzSR80MInb2G3coBoWNxplYc/edit

EU strategy on Artificial Intelligence

- https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1623335154975&uri=CELEX%3A52021PC0206
- https://digital-strategy.ec.europa.eu/en/policies/european-approach-artificial-intelligence
- https://datainnovation.org/2021/05/the-artificial-intelligence-act-a-quick-explainer/