Module
Project work

Learning objectives
Teachers will propose class-based project work to their students as a parallel activity to the other four modules. The goal of the project work is to foster active roles for participants in which they can engage in authentic and interesting tasks to achieve a common goal by means of collaborative work and to develop relevant skills. A choice can be made out of the topics presented. The related activities will promote the use of creativity and digital skills for editing audio and videos and for creating digital and non-digital material.

Topics and activities	
Phase 1	Identify an Ai-based technology Chatbots / Image recognition / Spam filter
Phase 2	Discover how it works
Phase 3	Applications in the real world and ethical analysis
Phase 4	Disseminate the results

Digital competences (DigComp 2.1)

Area 1: Information and Data Literacy
- 1.1 Browsing, searching and filtering data, information and digital content

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
- 4.2 Protecting personal data and privacy
- 4.3 Protecting health and well-being
- 4.4 Protecting the environment

Area 5: Problem solving
- 5.1 Solving technical problems
- 5.3 Creatively using digital technologies

DigCompEdu competences

Area 1: Professional Engagement
- 1.1 Organisational communication

Area 2: Digital Resources
- 2.1 Selecting digital resources
- 2.3 Managing, protecting and sharing digital resources

Area 3: Teaching and Learning
- 3.2 Guidance
- 3.3 Collaborative learning
- 3.4 Self-regulated learning

Area 4: Assessment
- 4.3 Feedback and planning

Area 5: Empowering Learners
- 5.2 Differentiation and personalisation
- 5.3 Actively engaging learners

Area 6: Facilitating Learners' Digital Competence
- 6.1 Information and media literacy
- 6.2 Digital communication and collaboration
- 6.3 Digital content creation
- 6.4 Responsible use
- 6.5 Digital problem solving

Educational goals

Teachers will design and implement original group-based project works based on the topics discussed in the modules and responding to the interests and needs of the specific class. Projects will be designed and planned with students ensuring their active and meaningful participation.

Summary

1. Subject(s): All
2. Topic or Unit of Study: Parallel study of topics discussed in module 1-4
3. Grade/Level: Middle school
4. Objective: application of the learned content in a project focused on a real-life context, with special attention to collaboration and autonomy in the learning process

Implementation

Four phases

The project is carried out in four phases, with each phase thematically linked to the four educational modules. This means that the students will most likely be able to continue to the next activity of the project once they are nearing the end of a module. Using the knowledge and/or skills they learned during the module, they can apply this to their project.

Phase 1: Identify an Ai-based technology

Once the groups are identified, students will start to work on a specific AI-technology. The technology that will be analysed in their work can come from the ones identified in the activities of Module 1 or it can be assigned by the teachers (see for instance the examples reported below)

Phase 2: Discover how it works

In the second phase students will discover how this technology works, by creating a small demo or project in Teachable Machine and/or Scratch (see Module2) depending on the types of activities proposed. This part of the project can also be implemented through unplugged activities (pen and paper), replicating the work of the technology using analogical material. The outcome of this phase is to have a first hand-on experience on how the identified technology works, getting the basis for the activities of the following phase.

Phase 3: Applications in the real world and ethical analysis

In this phase the group will explore applications of the technology in different domains (for instance educational, health, entertainment, etc.). The goal of this phase is to promote independent study to analyse possible applications, investigating positive and negative uses and

applying the ethical matrix of Module 3 to further analyse the implications of such AI-based technology.

Phase 4: Disseminate the results

The last phase is dedicated to the dissemination of the information acquired in the previous phases, creating digital or non-digital outputs (e.g. posters, documents, videos, slideshow, etc.) for presenting what the students have discovered to their peers or parents.
Teachers can consider peer-assessment for involving students in assessing the work of their peers based on shared guidelines or rubric.

Practical examples

Technology	Phase 1	Phase 2	Phase 3	Phase 4	Resources
Chatbot	Students investigate the concept of chatbot (maybe letting them try out some existing chatbots). This can be followed by a discussion on whether a chatbot can be perceived as intelligent and why a chatbot can be perceived as AI. Example of chatbot that can be tested: https://en.akinator.com/ (in english) Other example in country language	Students try to design a simple chatbot in order to understand how it works. Pen and paper: https://medium.com/the-chatbot-guru/how-to-design-a-chatbot-with-pen-and-paper-b4a34ee3c06b Teachable machine: Build an audio model that recognizes between “yes” or “no” words. Scratch: *“Chatbots”* activity in https://machinelearningforkids.co.uk/#!/worksheets	Students research the opportunities but also the limitations of a chatbot. Questions to be answered could include: will it be able to answer all your questions? Will it give the right answer? Can and should a chatbot be able to respond emotionally? Are there other ethical questions to be considered before presenting it to people?	Students look into the consequences of the designed robot when it is used in the real world. The students should reflect on the behaviour of the chatbot they designed and how people might react to it (also taking into account the answers found in the previous activity). They might test their chatbot with other classmates or their family/friends to see how they will react to it. They can make a presentation of their findings.	UNICEF Safeguarding girls and boys - When Chatbots answer their private questions https://www.unicef.org/eap/media/5376/file

Face recognition	Students discover how algorithm can recognize facial features, understanding applications of face recognition	Students try to training a machine learning algorithm for recognizing faces Pen and paper: Exercise 2.1.1 can be modified to use people faces Teachable machine: students can train an algorithm for recognizing faces (e.g. famous people) Scratch: students can try face sensing (2.2.1) or more advanced projects such as "*Face Lock*" https://machinelearningforkids.co.uk/#!/worksheets	Students investigated opportunities and challenges of facial recognition. Useful documents can be EU regulation for facial recognition software or newspaper articles discussing the ethical challenges of using facial recognition in school	Students can test their chatbot with other classmates or their family/friends and how people might react to it. They can make a presentation of their findings.	Regulating facial recognition in the EU https://www.europarl.europa.eu/RegData/etudes/IDAN/2021/698021/EPRS_IDA(2021)698021_EN.pdf Newspaper journal https://theconversation.com/facial-recognition-in-schools-here-are-the-risks-to-children-170341
Digital assistants	Students explore how conversation agents (e.g. Alexa, Google Now, Siri) work investigating concepts such as Natural Language	Students try in a controlled way some digital assistants (if available) or work on designing simple tasks simulating a digital assistant.	Students investigate bias and ethical challenges of conversation agents. For example they can discuss the etiquette for interacting with	Students make a presentation or a video for presenting their findings.	https://towardsdatascience.com/how-amazon-alexa-works-your-guide-to-natural-language-processing-ai-7506004709d3

	Processing or Conversational AI	Teachable Machine: Build an audio model that recognizes between “yes” or “no” words / or recognize a name Scratch: try the project “*Smart Classroom*” in https://machinelearningforkids.co.uk/#!/worksheets (advanced)	conversation agents or discussing privacy implications for digital assistants.		
Social networks	Students explore how social networks such as Facebook, Instagram and TikTok integrate AI to display targeted advertisement and personalized information	pen and paper: Facebull https://educationaltoolsportal.eu/educationaltoolsportal/en/tools/facebull Scratch: see activity What does Twitter think? in https://machinelearningforkids.co.uk/#!/worksheets (advanced)	Investigate effects of social media in communication and information discovery (e.g. filter bubble) https://en.wikipedia.org/wiki/Filter_bubble#:~:text=The%20results%20of%20the%20U.S.,new%20interest%20in%20the%20term	Students make a presentation or a video for presenting their findings.	
Video platforms (e.g Youtube,	Students explore applications of AI in video platforms such	Scratch: try the project “*Judge a book*” in	Discuss implications of recommendations in such systems	Students make a presentation or a video for presenting	

Netflix)	as youtube and netflix.	https://machinelearningforkids.co.uk/#!/worksheets (advanced)	(discuss filter bubble effect or effect of some features on binge-watching)	their findings.	
AI for sustainability	Students can explore applications of AI for supporting sustainability and the green economy. They can choose the projects listed here https://www.crisscrossed.net/2018/12/19/12-inspiring-examples-of-artifical-intelligence-for-good/	Explore each case study or search online for other similar examples (in your country or new projects). Some activities related to AI and sustainability can be also found here: AI for Oceans https://code.org/oceans Activities related to AI and machine learning applied to sustainability	Discuss implications following the ethical matrix of Module 3	Students make a presentation or a video for presenting their findings.	https://kidscodejeunesse.org/blog?b=2020-07-17-artificial-intelligence-and-the-SDGs
Women in AI	Student will learn about top women AI experts such as: [Italy] **Francesca Rossi** (IBM researcher and world leader in the ethics of Artificial Intelligence) / **Rita Cucchiara** (professor of computer science and expert in pattern recognition) / **Fosca Giannotti** (director of research of computer science at the Information Science and Technology Institute “A. Faedo” of the National Research Council) [Romania] **Doina Precup** (professor of Computer Science and expert in applications of machine learning techniques to real-world problems)				

	[Greece] **Maria Petrou** (she was professor of Image Analysis and pioneer in the fields of artificial intelligence and machine vision) / Elpiniki Papageorgiou (professor of Artificial Intelligence and expert in intelligent decision support systems) [Bulgaria] **Petia Radeva** (professor of Computer Science and Artificial Intelligence and expert in computer vision) Other AI pioneers and experts **Ada Lovelace** (first computer programmer) **Fei-Fei Li** (professor of computer science and co-director of the Stanford University Human-Centered AI) See https://www.ibm.com/watson/women-leaders-in-ai	