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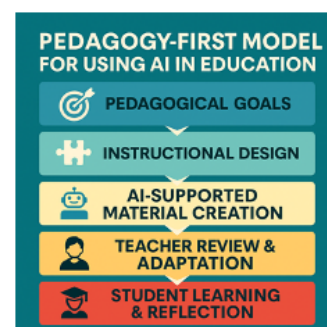
- **Project:** 101132954—DRONE—ERASMUS-EDU-2023-PI-FORWARD
- Teacher and school leaders training to promote Digital literacy and combat the spread of disinformation among vulnerable groups of

Technical Literacy to Combat Disinformation For Teachers

Age-appropriate activities

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Age-appropriate activities

Age-appropriate activities, taking into consideration needed competencies, curricular goals, suggested pedagogical methods, learning environments, when fighting disinformation in the age of AI, with relation to the human centred mindset considering cybersecurity issues too.

Activities for students aged 6-7

- **"Who made this story?" (Fighting disinformation):**
 - **Objective:** Students learn that humans are responsible for creating content, even if AI helps, and that not everything online is true.
 - **Activity:** Show the class two very simple "news stories" or drawings. One is clearly human-made (e.g., a child's drawing with imperfections), and the other is an age-appropriate AI-generated image or simple text (e.g., a perfectly symmetrical drawing of a cat, or a short, factual sentence about an animal generated by AI). Ask: "Who do you think made this? A person or a computer helper?" Discuss that computers can make things that look real but might not be, and humans are the ones who tell the computer what to do.
 - **Disinformation link:** Introduces the concept of content origin and potential for AI-generated falsehoods.
- **"My private information shield" (Cybersecurity/Data privacy):**
 - **Objective:** Students understand what personal information is and why it's important to keep some of it private.
 - **Activity:** Give each child a paper shield cutout. Ask them to draw or write (with help) things that are "private" and they don't want everyone to know (e.g., their address, their family's last name, special secrets). Discuss why this information is important to keep safe, connecting to the idea that AI systems "prey on and exploit personal data". Role-play saying "no" to a pretend computer asking for private details.
 - **Cybersecurity link:** Direct engagement with data privacy and consent.
- **"Good helper, bad helper AI game" (Human-centred mindset & ethics):**
 - **Objective:** Students learn that AI can be helpful but needs human control to ensure it's used ethically and doesn't do harm.
 - **Activity:** Present simple scenarios: "A robot can help you clean your room very fast (good helper!). Should the robot also choose what toys you play with? (Discuss: No, that's your choice!)" or "An AI drawing app can draw a perfect circle for you (good helper!). Should the app draw your whole picture for you without you trying? (Discuss: No, you need to learn and try too!)".... This encourages critical thinking about AI's purpose and limits.
 - **Disinformation/Cybersecurity link:** Reinforces that humans should evaluate AI's outputs and maintain agency, crucial for questioning misleading information or protecting privacy.

- **"Fair robot sorting" (Ethics of AI - non-discrimination):**

- **Objective:** Students identify basic biases and understand the importance of non-discrimination
- **Activity:** Show pictures of diverse people (different genders, skin colours, abilities, etc.). Introduce a pretend "robot sorter" that has been trained to only recognise certain types of people. Ask: "Is this robot being fair? Why not? Should a robot be able to see and help everyone?" Discuss that AI should be inclusive and accessible.
- **Disinformation link:** Relates to the idea that disinformation can deepen inequalities and discrimination.

Learning environments (Level 1: Understand)

Learning environments should be accessible and provide a mix of digital and non-digital resources to facilitate foundational understanding.

- **Unplugged learning settings:** Use physical materials like paper-based stories, worksheets, flashcards, and drawing materials for activities that don't require computers. This helps students grasp abstract concepts without relying on complex technology.
- **Locally available AI tools...:** Utilise everyday devices such as mobile phones with basic AI applications (e.g., voice assistants, simple image filters, basic recommendation systems on child-friendly platforms) to demonstrate AI concepts in a familiar context.
- **Pre-downloaded or recorded videos...:** Use curated, age-appropriate videos that present simplified case studies or dilemmas related to AI's impact on human choices, fairness, or privacy.
- **Basic online resources (teacher-led):** With teacher supervision, use child-friendly search engines or online videos to find examples of AI in the real world, reinforcing content authenticity and trustworthiness.

These recommendations for 6-7 year olds lay a foundational understanding of AI's nature, its ethical implications, and the importance of human judgment and control, which are essential in fighting disinformation and addressing cybersecurity issues in an age increasingly shaped by AI. Parents can play a crucial role by "modelling good behaviour" and engaging in "ongoing conversations" about online content.

Activities for students aged 7-8

- **"Who's the boss? My robot Friend" activity**
 - **Competencies addressed:** Human agency, human determination in human–AI interaction, basic understanding of AI foundations.
 - **Curricular goal:** Foster an understanding that AI is human-led and cannot replace human thinking.
 - **Activity:** Introduce a simple "robot" (it could be a human acting like a robot, a simple toy robot, or an image of one). Give the robot very specific, simple instructions for a task (e.g., "draw a blue circle"). Then, introduce a scenario where the robot wants to draw something else or make its own choice. Lead a discussion asking: "Who is the real boss here? The human or the robot?" Emphasise that **humans design and control robots and AI, and humans are responsible for what AI does**. Discuss that while AI can help, humans are always in charge of important decisions.
 - **Pedagogical method:** Role-play, discussion, scenario-based understanding.
 - **Learning environment:** Classroom, simple props, or images of robots/AI tools.

- **"Fair or unfair AI game" activity**
 - **Competencies addressed:** Ethics of AI (non-discrimination, do no harm), awareness of biases.
 - **Curricular goal:** Facilitate scenario-based understandings of ethical principles on AI, particularly non-discrimination, and guide embodied reflection on ethical principles.
 - **Activity:** Show students a series of simple images or stories (e.g., drawings of diverse children, animals, or objects). Pretend an "AI" (you, the teacher, or a pre-programmed simple tool) makes a categorisation or recommendation that is clearly unfair or biased (e.g., only recommending certain types of toys to girls, or always choosing boys for a particular activity based on their image). Ask: **"Is this fair? Why or why not?"** Explain that sometimes, the **information humans give to AI can be unfair or biased**, and that we need to teach AI to be fair to everyone.... Discuss how they can help make things fair.
 - **Pedagogical method:** Case studies on controversies, group reflection on ethical dilemmas.
 - **Learning environment:** Unplugged materials like printed story cards or drawings, or a simple online tool that can be deliberately biased for demonstration.

- **"Truth teller, story maker" activity (Basic disinformation awareness)**
 - **Competencies addressed:** Critical thinking, understanding types of false information.
 - **Curricular goal:** Identify and leverage pedagogical benefits of AI tools to facilitate lesson planning while mitigating risks, helping students discern real from fake content.

- o **Activity:** Show students a mix of pictures or very short "news" snippets (written or spoken by you) that are clearly either real (e.g., a photo of your school building, a simple fact like "the sky is blue") or obviously fake/silly (e.g., a picture of a cat flying a spaceship, a "news" story about talking apples). Some could be simple AI-generated images that are clearly not real. Ask students to sort them into two piles: "**Truth teller**" or "**Story maker**." Discuss why they chose each pile, pointing out simple clues like "**Does it look real?**," "**Is it silly?**" or "**Does it make sense?**" Explain that sometimes people create "story maker" content on purpose to trick others, and we need to be smart about what we see online....
- o **Pedagogical method:** Example-based definition, fostering critical thinking, discussion. Gamification.
- o **Learning environment:** Unplugged materials (printed images, simple text snippets), simple online image generators if appropriate.
- **"My digital footprint story" activity (Privacy and responsible use)**
 - o **Competencies Addressed:** Safe and responsible use, data privacy awareness.
 - o **Curricular goal:** Be aware of the risks of disclosing data privacy and take measures to ensure data is collected, used, shared, archived, and deleted only with consent.
 - o **Activity:** Tell a simple story about a character who shares personal information online (e.g., their address, their family's plans) without thinking, and then explain a simple, age-appropriate consequence (e.g., a stranger knows where they live, or they get too many unwanted messages). Ask students to draw or discuss what information is "private" (like their home address, their full name, their birthday) and what is "public" (like their favourite colour, their favourite animal). Emphasise that **once private information is shared online, it's very hard to get back**, and it's important to **ask for permission** before sharing others' information too.
 - o **Pedagogical method:** Storytelling, discussion, group reflection on personal implications.
 - o **Learning environment:** Unplugged setting with drawing materials or worksheets.

By engaging in these types of activities, students aged 7-8 can begin to build fundamental AI literacy, understand the human-centred aspects of technology, and develop early critical thinking skills essential for navigating an AI-rich information environment responsibly.

- **Learning environments**

The activities can be implemented in diverse learning environments, utilising both low-tech and readily available digital resources.

 - o **Unplugged settings:** Using paper-based materials like stories, worksheets, posters, and simple role-play scenarios. This also helps students retreat from "algorithm-controlled information cocoons".

- o **Locally available AI tools:** Leveraging familiar devices like smartphones and basic AI applications (e.g., voice assistants, simple drawing apps, or video recommendation platforms).

- o **Curated digital resources:** Utilising pre-downloaded or recorded videos and age-appropriate case studies that illustrate AI's impact and ethical considerations.

- **"Who's the Boss?" - Visualizing Human Agency**
 - **Activity:** Ask students to **draw concept maps or flowcharts** showing the "life cycle" of a simple AI tool they might encounter (like a smart speaker answering questions, or a game character's behaviour). For each step (e.g., collecting information, deciding what to say/do), ask them to identify where a human is involved in making decisions or setting the rules.
 - **Goal:** Help students visualize that AI systems are **human-led** and that **human decisions** are behind their creation and operation. Discuss what might happen if humans *weren't* involved in these steps, leading to silly or unhelpful outcomes, thereby reinforcing the importance of human agency.
 - **Cybersecurity Link:** Introduce the idea that if the *humans* who design or feed information to AI tools make mistakes or have bad intentions, the AI can be misused to create confusing or harmful information (misinformation/disinformation). Discuss **data ownership** and **data privacy** at a basic level, explaining that humans decide what information the AI can use and how it should protect personal data.

- **"The AI Rules Committee" - Simulating Control and Ethics**
 - **Activity:** Present simple, age-appropriate scenarios involving AI, for example:
 - An AI tool that suggests answers for a school quiz.
 - A game character whose actions seem unfair.
 - A social media app that suggests videos based on what friends watch.
 - **Discussion & Debate:** Divide students into "committees" (small groups) to discuss if and how these AI tools should be used, and what "rules" (ethical principles) humans should follow when using or designing them.... This can be a simplified "courtroom debate" where students "evaluate creators' intents".
 - **Goal:** Promote critical thinking about **human control** over AI and the necessity of **ethical principles** like "do no harm" and "non-discrimination".
 - **Cybersecurity Link:** Discuss scenarios where AI might share too much information or create content that isn't true. Emphasize that rules are needed to protect people's **privacy** and ensure the AI isn't used to spread **misinformation** or make unfair judgments.

- **"AI Helper or AI Boss?" - Scenario-based Interaction**
 - **Activity:** Use **real-world or simulated scenarios** where AI tools are used to assist humans. For example:
 - AI helping a doctor find patterns in medical images.
 - AI helping to auto-correct spelling when writing.
 - AI helping translate languages.
 - **Role-play/Storytelling:** Students can act out or create stories about these scenarios, focusing on the collaboration between humans and AI. Discuss: "Who is in charge?" and "What would happen if the AI made all the decisions?".

- o **Goal:** Encourage students to recognize AI's **contributions** while reinforcing that **human capacities and control** are paramount. This helps students differentiate between AI as a tool to *enhance* human abilities versus one that might *usurp* human decision-making or intellectual development.
- o **Cybersecurity Link:** Discuss how AI assisting in tasks means we still need to check its work. If an AI translates something, is it always perfectly accurate? If an AI helps write something, do we check if it's true or fair? This links to **content authentication** and **transparency**, where humans verify AI outputs.
- **"Spot the AI Trick!" - Recognizing Misinformation**
 - o **Activity:** Show students simple examples of manipulated images or text (age-appropriate, clearly distinguishable as fake, e.g., a clearly Photoshopped animal or a silly made-up news headline). Guide them to identify what makes it "tricky" or "not real."
 - o **Goal:** Begin to develop basic awareness of how AI can generate new content, and that some content might be "fake" or "not trustworthy". This builds early **media literacy** skills crucial for combating disinformation.
 - o **Cybersecurity Link:** Explain that some people use computers (like AI) to make fake things to trick others. This links to the concept of **disinformation** (intentionally misleading information) [Conversation History], and how it exploits human tendencies, like trusting what they see. The idea of "prebunking" or "inoculation games" can be introduced by explaining how practicing spotting fakes helps protect them from being tricked.
- o **Learning Environments**

These activities can be implemented in various learning environments:

 - **Unplugged settings:** Many discussions and concept mapping activities can be done with paper, pens, and group work, emphasizing critical thinking without needing digital devices.
 - **Locally available AI tools:** Utilize everyday AI tools found on smartphones (e.g., basic voice assistants, simple photo filters) to make concepts tangible and relatable.
 - **Pre-recorded videos/resources:** Use pre-downloaded or recorded videos that present case studies or ethical dilemmas in an age-appropriate format.
 - **Supervised online exploration:** Under strict supervision, simple, safe online search engines or educational AI platforms (if available and vetted) can be used to explore examples of AI and its uses.

Ultimately, fostering a **human-centred mindset** in young students involves building their awareness that AI is a tool created and controlled by humans, and that humans bear the responsibility for its ethical and safe use. By integrating basic cybersecurity awareness, such as data privacy and recognizing manipulated content, within this human-centred approach, communities can equip individuals to become more resilient against the spread of misinformation

- **"AI Detective: Spotting the 'Stitched' Story"**
 - **Activity Description:** Introduce the concept of AI generating fake content, such as deepfakes, by explaining them as "stitched" or "made-up" media. Show clearly identifiable, age-appropriate examples of AI-generated images or texts (e.g., a fantastical animal composite, a made-up news headline about a silly event). Provide students with a simplified checklist of "clues" to look for, such as blurry edges in images, repetitive or nonsensical text, or content designed to provoke strong emotions.
 - **Competencies Addressed:** **Human agency** (critically evaluating AI outputs), **Ethics of AI** (understanding the "do no harm" principle and transparency), and **AI techniques and applications** (basic understanding of content generation). This also builds early media literacy skills for combating disinformation.
 - **Pedagogical Method:** **"Spot the AI Trick!"** activity, where students work in pairs or small groups to identify manipulated content and discuss *why* it might be fake and *who* might create it, connecting to the human intent behind AI.
 - **Cybersecurity Link:** Explain that fake content can be used to trick people or to steal personal information. Introduce the basic idea of "content authentication" or "AI nutrition labels" that can help users discern real from synthetic media.
- **"My Data, My Rules!"**
 - **Activity Description:** Explain that many apps and online games collect "data" about users (e.g., what they click, how long they play, what they type) using simple, relatable metaphors. Present age-appropriate scenarios where an app asks for personal information (e.g., asking for their full name, address, or personal photos).
 - **Competencies Addressed:** **Human agency** (data ownership, consent), and **Ethics of AI** (data privacy).
 - **Pedagogical Method:** **Role-play or scenario-based discussion.** Students discuss if they would provide the information and explain their reasoning, focusing on the concept of **consent** and understanding who "owns" their data.
 - **Cybersecurity Link:** Emphasize that if personal data isn't protected, it could be used for unintended purposes, potentially leading to targeted disinformation or unwanted advertising. Stress the importance of asking a trusted adult before sharing any personal information online.
- **"The 'Echo Chamber' Challenge"**
 - **Activity Description:** Introduce the concept of "echo chambers" in a simple way (e.g., "imagine only hearing people who think exactly like you"). Explain that online algorithms might show them only things they already like or agree with, which can limit their exposure to diverse perspectives.
 - **Competencies Addressed:** **Human-centred mindset** (social responsibility, critical thinking about societal impact), and **Ethics of AI** (non-discrimination,

understanding algorithmic biases).

- o **Pedagogical Method: Group discussion and activity.** Provide a simple, non-controversial topic (e.g., different types of pets, hobbies, local school events). Ask groups to find diverse (age-appropriate) facts or opinions on the topic. Discuss how relying on only one source or one viewpoint can lead to an incomplete understanding. Highlight how AI algorithms can amplify this effect by reinforcing existing preferences.
- o **Cybersecurity Link:** Explain that disinformation thrives in environments where people are only exposed to one viewpoint or where fake accounts and bots amplify certain messages, making them appear more popular. Encourage seeking out multiple, diverse sources as a form of "digital resilience".
- **"Human vs. Machine: Decision Dilemmas"**
 - o **Activity Description:** Present simple, age-appropriate scenarios where an AI system could make a decision (e.g., an AI choosing what learning game a student should play next, or an AI suggesting answers for a simple quiz).
 - o **Competencies Addressed: Human agency** (emphasizing human control and avoiding the atrophy of human skills), and **Ethics of AI** (proportionality, human determination).
 - o **Pedagogical Method: Scenario-based discussion and debate.** For each scenario, ask students to consider: "Should the AI make this decision, or should a human decide?" Discuss the benefits and risks of letting AI make decisions, especially "high-stakes" ones within an age-appropriate context (e.g., AI determining who gets to play a role in a school play, or AI grading an essay without human review)⁴⁷⁴⁸. Reinforce that humans should always retain control, especially for decisions requiring values, judgment, or with significant outcomes.
 - o **Cybersecurity Link:** Discuss how over-reliance on AI can diminish human critical thinking and decision-making skills. Explain how disinformation can manipulate decisions by feeding biased or false "predictions" from AI, underscoring the necessity for human oversight and critical verification of AI outputs.
 - o **Learning Environments**
These activities can be flexibly implemented in various learning environments:
 - **Unplugged Settings:** Many of the discussions, role-plays, and checklist activities can be conducted effectively using only paper, pens, and group interaction, removing the need for digital devices.
 - **Classroom:** Provides an ideal setting for structured discussions, group work, and scenario-based learning, allowing for immediate feedback and peer interaction.
 - **Computer Lab/Tablets:** For supervised exploration of child-friendly AI tools. Simple image generators like Google's Teachable Machines can be used to demonstrate how AI learns and how biases can occur. Basic voice assistants or educational apps incorporating AI can also serve as relatable examples.

- **Home/Community:** Encourage discussions and reflections on / encountered in daily life, such as smart devices or streaming service

recommendations. Parental involvement in modelling critical thinking and discussing online content is crucial for reinforcing learning.

By engaging students aged 9-10 in these hands-on, discussion-based activities, communities can lay a strong foundation for developing a **human-centred mindset** and essential **media literacy** skills, preparing them to critically navigate and resist disinformation in the increasingly AI-saturated digital world

Activities for students aged 10-11

- **"AI-Generated or Not? The Disinformation Detective"**
 - **Activity Description:** Introduce students to the concept of **AI-generated content** (e.g., text, images, or simple audio clips) by showing them side-by-side examples of real and AI-created media that are clearly distinguishable at first glance. Explain that AI can "make up" things, just like a story, but sometimes these "made-up" things can look very real. Students work in small groups, acting as "disinformation detectives" to identify which examples are AI-generated and discuss the subtle clues they used, such as repetitive patterns in images or slightly nonsensical phrases in text.
 - **Needed Competencies & Curricular Goals:** This activity directly supports students to **foster critical thinking on AI** by discussing its benefits and risks, specifically the risk of AI-generated content being less trustworthy. It helps them understand that **AI is human-led** and that human decisions influence its impact, including the creation of manipulated media. Students will also gain **basic conceptual knowledge on AI** and its techniques for generating outputs.
 - **Suggested Pedagogical Method:** **"Spot the AI Trick!"** through example-based definition and scope of AI, encouraging investigation and experiential learning. Gamification can increase student interest and motivation.
 - **Learning Environment:** This can be done in an **unplugged setting** using printed materials and worksheets, or with **digital devices** (e.g., tablets or computers) showing pre-downloaded or carefully curated age-appropriate AI-generated content.
 - **Cybersecurity Link:** Explain that sophisticated AI can create "deepfakes" (fake images or videos) that are highly realistic and can be used to mislead people or spread false information. Introduce the idea of "content authentication" (like an "AI nutrition label") to help users tell real from fake content, and discuss how this helps protect against deceptive tactics.
- **"My Data, My Digital Self"**
 - **Activity Description:** Using a simple analogy (e.g., leaving "digital footprints" when they walk online), explain how online games, apps, and websites collect "data" about users.... Discuss what "personal data" means (e.g., their favourite colours, game scores, where they click). Present age-appropriate scenarios where an app asks for too much personal information (e.g., their home address for a simple game). Students role-play deciding whether to share information, explaining their reasons based on **data ownership** and **consent**. They can create a "My Data, My Rules!" poster outlining safe sharing practices.
 - **Needed Competencies & Curricular Goals:** This activity directly addresses **human agency** by focusing on data ownership and the importance of consent in data collection and processing. It fosters an **understanding of ethical principles** related to data privacy and security, and why neglecting them can

cause harm. Students will learn to protect their own and their peers' data privacy.

- o **Suggested Pedagogical Method: Role-play or scenario-based discussions** coupled with individual or group reflection on personal implications of ethical dilemmas.
 - o **Learning Environment:** This activity can be effectively conducted in an **unplugged classroom setting** with worksheets and flipcharts, or by using simple digital tools for creative poster design.
 - o **Cybersecurity Link:** Emphasise that personal data, if not protected, can be misused for unwanted advertising, or worse, to create targeted disinformation that exploits personal preferences, which is a tactic used in cyber warfare to manipulate public opinion.... This links to the concept that disinformation exploits human vulnerabilities.
- **"The Echo Chamber Challenge"**
 - o **Activity Description:** Introduce the concept of **"echo chambers"** by explaining it as only hearing voices that sound like your own (e.g., "Imagine if all your friends liked only one flavour of ice cream, and that's all you ever heard about!"). Explain that online systems might show them only things they already like or agree with, which can limit their exposure to diverse perspectives. Provide a simple, non-controversial topic (e.g., different types of animals or hobbies). Students then find and present diverse facts or opinions on the topic. They reflect on how relying on only one source or viewpoint can lead to an incomplete understanding
 - o **Needed Competencies & Curricular Goals:** This activity helps nurture **critical thinking on AI's societal impact** and how over-reliance on AI (or algorithms) can undermine thinking skills and human agency. It builds an understanding of **non-discrimination** and algorithmic biases, and how they can deepen inequalities and exclusion. Students also learn their responsibility to contribute to building inclusive AI societies.
 - o **Suggested Pedagogical Method: Group discussions** and case studies on scenarios containing controversies around AI, promoting opinion-taking and fostering critical views
 - o **Learning Environment:** Best suited for a **classroom setting** for interactive group discussions and collaborative activities. Can incorporate search engines for supervised research on diverse viewpoints.
 - o **Cybersecurity Link:** Explain that disinformation thrives in echo chambers because algorithms reinforce existing preferences, making it easier for false narratives to spread without challenge.... This directly relates to how AI systems can amplify biases. Students should learn to seek out multiple and diverse sources to build resilience against such manipulation.
 - **"Human vs. Machine: Decision Dilemmas"**
 - o **Activity Description:** Present **simple, age-appropriate scenarios** where an AI system could potentially make a decision (e.g., an AI choosing the "best" path to school based on traffic, or an AI suggesting what art project a student should do next). Discuss when it's appropriate for AI to assist or automate

tasks, and when humans should always retain ultimate control, especially in decisions involving values, judgement, or significant personal impact.

- o **Needed Competencies & Curricular Goals:** This activity aims to deepen students' understanding of **human accountability and human determination** in AI use, challenging overhyped claims about AI substituting humans in

high-stakes decisions. It helps them critically reflect on AI benefits, limitations, and risks in their daily lives. It also supports their ability to reflect on how AI can undermine human thinking skills.

- o **Suggested Pedagogical Method: Scenario-based discussions and debates**, simulating decision-making processes. This encourages critical analysis and articulation of reasoning.
- o **Learning Environment: A classroom setting** is ideal for fostering structured debates and interactive discussions.
- o **Cybersecurity Link:** Discuss how over-reliance on AI for decision-making can diminish human critical thinking and decision-making skills, making individuals more susceptible to manipulation. Explain that disinformation campaigns can target these vulnerabilities by feeding biased or false AI "predictions" to influence real-world decisions. Reinforce that human oversight and critical verification of AI outputs are crucial to maintain human agency and prevent harmful outcomes.

These activities emphasize **hands-on engagement, critical thinking, discussion, and reflection**, fostering a human-centred approach to AI literacy and media literacy, which are vital for fighting disinformation and addressing cybersecurity challenges in the digital age.

- **"Human Accountability & AI Decision-Making" (Human-centred mindset & Fighting AI Disinformation)**
 - o **Activity:** Present students with age-appropriate **case studies or simulated scenarios** where an AI system makes a decision that could be harmful or biased if not properly overseen by humans. For example, an AI recommending books for a school library based on past popularity (leading to lack of diversity) or an AI-generated message that is highly convincing but subtly misleading about a school event. Students discuss:
 - "What decision did the AI make?"
 - "Who taught the AI to make this decision (what data was used)?"
 - "What could go wrong if a human doesn't check it?"
 - "Who is ultimately responsible if something goes wrong?"
 - o **Purpose:** Deepens understanding that **AI is human-led** and that **human accountability** is crucial. It directly addresses how AI can generate misleading content (synthetic disinformation) and fosters critical thinking about AI's role in decision-making, countering the notion that AI is infallible.
 - o **Pedagogical Method: Scenario-based practices and investigating the impact of AI-assisted decisions.**
 - o **Learning Environment:** Group discussion, role-playing, possibly using printed scenarios or simple online polls for 'decisions'.

- **"Digital Footprint & Privacy Shield Design" (Ethics of AI & Cybersecurity)**
 - **Activity:** Students learn about their "digital footprint" – the data they leave behind online (e.g., what apps they use, what they search for, what games they play). Using simple metaphors (e.g., "data crumbs"), explain how this data can be collected and used by AI systems, sometimes without their full consent. Students then **design a "Privacy Shield" or "Safe Online Habits" checklist** that outlines measures they can take to protect their personal data, emphasizing what information should not be disclosed in prompts or online interactions. Discussing **the hidden risks for students with special needs** should also be considered.
 - **Purpose:** Cultivates **self-awareness and habitual compliance with ethical principles for responsible AI use**, particularly **data privacy and safety**, which are key cybersecurity concerns. This helps them understand how their data might be exploited for targeted disinformation.
 - **Pedagogical Method:** Designing an 'ethics kit' for self-disciplined, responsible use of AI and **simulation of typical AI incidents and risk management**.
 - **Learning Environment:** Interactive presentation, creation of physical or digital checklists/posters, group discussions.

- **"Deepfake Detective: Spotting the Signs" (AI Techniques & Applications & Fighting Disinformation)**
 - **Activity:** Show students pairs of similar images or short audio clips: one authentic and one with subtle, age-appropriate AI manipulation (e.g., slightly altered faces, unnatural speech patterns, or generated text with minor errors). Use examples from readily available, simple AI image or text generators (e.g., free online tools, or platforms like Google's Teachable Machine where they can observe how AI 'learns' and sometimes creates imperfect outputs). Challenge them to identify which is "real" and which is "AI-generated" and explain *why* they think so, focusing on specific "tells". Discuss how **AI models are trained using data** and how **biases can be embedded** if the data is not diverse.
 - **Purpose:** Develops **application skills** in understanding how AI creates content and how to critically evaluate its authenticity. This is vital for combating **hyper-realistic AI disinformation (deepfakes)** and understanding algorithmic bias.
 - **Pedagogical Method:** **Data biases lab** (simplified) and **example-based learning to demonstrate AI capabilities and limitations**.
 - **Learning Environment:** Digital devices (tablets/computers) with controlled internet access, or pre-downloaded images/audio, worksheets for observation.

- **"Ethical AI System Design Challenge" (AI System Design & Ethics of AI / Cybersecurity)**
 - **Activity:** Divide students into small groups. Give each group a simple, real-world problem they might want to solve using technology (e.g., helping classmates find lost items, organising recycling at school, translating signs in a

multicultural neighbourhood). Challenge them to **design a basic "ethical helper"** for this problem⁴⁸. They should consider:

- "What information would our AI need (data)?"
- "How would it 'learn'?"
- "What ethical rules would we build into it to make sure it's fair (non-discriminatory) and private (doesn't collect too much personal data)?"

"How would we make sure it doesn't accidentally spread misinformation or harm anyone?"

- o They can present their "ethical AI design" using drawings, simple flowcharts, or a short presentation.
- o **Purpose:** Introduces foundational concepts of **AI system design** and applies **ethics by design** principles.... This activity directly connects AI ethics to preventing negative outcomes like privacy breaches or the creation of harmful content (disinformation), fostering responsibility in technology creation.
- o **Pedagogical Method: Project-based learning** to acquire methodological knowledge on AI architecture, emphasizing **human-centred values and ethical principles**.
- o **Learning Environment:** Classroom with whiteboards or large paper, markers, and possibly simple digital tools for prototyping.

Activities for students aged 11-12

- **"Deepfake Debunkers: Fact-Checking AI Media"**

- **Activity Description:** Building on previous understanding, students will delve deeper into **identifying AI-generated manipulated content**, such as deepfakes, which are highly realistic but fabricated... Provide students with a set of carefully selected, age-appropriate images or short video/audio clips, some of which are real and some subtly manipulated by AI. In small groups, students act as "digital detectives", using readily available online tools (e.g., reverse image search, simple deepfake detection websites, if appropriate and vetted) to analyse the media. They should focus on **identifying subtle inconsistencies**, such as unusual blinks, unnatural movements, distorted backgrounds, or unusual speech patterns for audio. After their analysis, groups present their findings, explaining the clues they used and the tools that assisted them.
- **Needed Competencies & Curricular Goals:** This activity directly supports **AI techniques and applications (Application skills)** by enabling students to proficiently operate AI tools and deepen their understanding of AI technologies and their outputs. It also reinforces **Ethics of AI (Safe and responsible use)** as students practise identifying and mitigating risks associated with AI-generated content. Students will learn to critically evaluate and leverage open-source AI tools for verification.
- **Suggested Pedagogical Method: Facilitated experiential learning and problem-based inquiry**, where students apply knowledge and develop practical skills through hands-on, guided exploration. Group analysis and presentation foster collaboration and critical discussion.
- **Learning Environment:** This activity requires **digital devices** (computers or tablets) with internet access to use online tools. Pre-downloaded or carefully curated media examples should be used to ensure age-appropriateness and safety.
- **Human-centred mindset & Cybersecurity Link:** Disinformation, including deepfakes, exploits human cognitive biases and emotions.... By learning to detect deepfakes, students are empowered to resist manipulation, reinforcing their **human agency** and promoting responsible information consumption4.... This activity treats disinformation as a **cybersecurity threat** by focusing on "content authentication" and identifying manipulated digital media, akin to detecting malicious cyber tactics.

- **"Data Detectives: Unmasking Algorithmic Bias"**

- **Activity Description:** Introduce students to simplified concepts of **algorithmic bias** by exploring how data used to train AI can lead to unfair or discriminatory outcomes. Provide age-appropriate scenarios or very simplified, anonymised datasets (e.g., a small set of fictitious job applications with biased patterns, or a collection of images showing a lack of diversity in training data for a hypothetical image recognition AI). In groups, students identify potential biases in the "data" and discuss how an AI trained on such data might make

biased decisions (e.g., a hiring AI disproportionately rejecting certain n a facial recognition system struggling with darker skin tones). They should

brainstorm ways to make the data more inclusive or suggest "anti-bias data labelling" principles.

- o **Needed Competencies & Curricular Goals:** This activity enhances **AI techniques and applications (Application skills)** by strengthening students' knowledge and skills in data analysis and understanding how AI models are trained. It deeply addresses **Ethics of AI (Safe and responsible use)** by fostering an understanding of non-discrimination and how algorithmic biases can impact individuals and society. It also directly relates to **Human-centred mindset (Human accountability)**, as students reflect on the human responsibility for fair AI design.
 - o **Suggested Pedagogical Method: Data biases lab and scenario-based discussions**, guiding students to apply their knowledge to identify and mitigate biases. Emphasis on collective discussion and critical examination of use cases.
 - o **Learning Environment:** Can be conducted in an **unplugged setting** using printed materials for simplified datasets and discussion prompts or using **digital devices** for basic data visualisation if tools are available.
 - o **Human-centred mindset & Cybersecurity Link:** This activity highlights how human decisions in AI design, particularly regarding data, can lead to negative impacts on human rights and social justice. It shows how AI can inadvertently or intentionally perpetuate discrimination, which aligns with **cybersecurity** by exposing vulnerabilities that can be exploited for targeted manipulation social division, like cyber tactics.
- **"Ethical AI Engineers: Designing for Trust"**
 - o **Activity Description:** Shift from just identifying issues to **proposing ethical solutions for AI systems**. Present students with a simple, age-appropriate real-world problem that AI *could* help solve (e.g., an AI assistant to help manage classroom tasks or an AI tool to sort recyclable materials). In groups, students brainstorm how to design an AI solution with **"ethics by design"** principles or embedded from the start. They should consider:
 - How to ensure **human oversight and control** over AI decisions (e.g., an AI suggesting a classroom schedule, but the teacher always makes the final decision).
 - How to protect **user privacy** (e.g., what data would the AI need, and how can it be anonymised?).
 - How to make the AI's "decisions" or suggestions **transparent and explainable** (e.g., why did the AI suggest this schedule?).
 - How to prevent **unintended biases**.
 - They can create a simple flowchart or diagram of their "ethical AI design" plan.
 - o **Needed Competencies & Curricular Goals:** This activity directly addresses **AI system design (Architecture design)** by engaging students in problem scoping and conceptualising an AI system. It solidifies **Ethics of AI (Ethics by**

design) by teaching students to integrate ethical principles into the design process. It also reinforces **Human-centred mindset (Human accountability)** by emphasising human responsibility in AI creation and use.

- **Suggested Pedagogical Method: Project-based learning and simulated design scenarios**, encouraging creative problem-solving with ethical constraints. **Debates** on ethical considerations in AI development.
 - **Learning Environment:** Best in an **unplugged classroom setting** for drawing diagrams and discussing concepts. Can be supplemented with pre-downloaded examples of AI system designs or simplified prototypes.
 - **Human-centred mindset & Cybersecurity Link:** This activity reinforces the idea that AI should **serve human capabilities** and protect human dignity and agency. By prioritising "ethics by design," students learn that robust, ethical AI systems are inherently more secure and less vulnerable to malicious manipulation, directly addressing **cybersecurity** by building resilience into the very foundation of AI tools.
- **"Disinformation Defence Team: Community Resilience"**
 - **Activity Description:** Focus on the **collective responsibility** in fighting disinformation. Students research age-appropriate examples of past or current disinformation campaigns (e.g., local rumours spread online, simplified historical propaganda, or health myths). In groups, they analyse:
 - How the disinformation spread (e.g., social media, word of mouth).
 - Who might have created/shared it and why (motives).
 - The potential harms caused.
 Based on their analysis, they design a "community defence plan" to **build resilience against future disinformation**. This could involve creating a public service announcement (e.g., a poster, short skit, or simple digital message) that teaches peers how to spot common disinformation tactics (e.g., emotional appeals, sensational headlines, anonymous sources). They can also role-play polite ways to correct misinformation shared by friends or family.
 - **Needed Competencies & Curricular Goals:** This activity deeply engages with **Human-centred mindset (Citizenship in the era of AI)** by fostering critical understanding of AI's societal impact and promoting responsible actions. It also addresses **Ethics of AI (Co-creating ethical rules)** by encouraging students to contribute to the adaptation of AI standards and regulations for ethical practices. It builds **media literacy**, a crucial skill for discerning truth from falsehood.
 - **Suggested Pedagogical Method:** **Case studies, group discussions, and project-based learning**, allowing students to research, analyse, and create solutions. Role-playing helps them practice social skills for addressing misinformation.
 - **Learning Environment:** A **classroom setting** is ideal for collaborative work and discussions. Students can use **unplugged materials** (poster

- boards, markers) or **digital devices** (for creating simple presentations or digital posters).
- o **Human-centred mindset & Cybersecurity Link:** This activity reinforces the idea of students as **responsible citizens** who actively contribute to inclusive AI societies. By designing community defence plans and practising social correction, students directly contribute to **strengthening human resilience** against disinformation, treating it as a

"cyber-psychological threat" that exploits human vulnerabilities. Media literacy programs are essential for this human defence.

These activities emphasise **hands-on application, critical thinking, collaborative learning, and ethical reasoning**, nurturing a human-centred approach to AI literacy and media literacy, which are vital for fighting disinformation and addressing cybersecurity challenges in the digital age.

How do community dynamics influence individuals' ability to identify and combat misinformation?

Community dynamics significantly influence individuals' ability to identify and combat misinformation, acting as both a catalyst for its spread and a foundation for collective resilience. Misinformation, defined as inaccurate or misleading information shared without intent to deceive, can become disinformation when purposefully disseminated to mislead or cause harm.... In the age of AI, this phenomenon is amplified, making community-based strategies increasingly vital⁶

How Community Dynamics Influence the Spread of Misinformation

Individuals often share information to **connect with one another and feel part of a social group**, sometimes prioritising this desire over verifying the truth. This innate human tendency is exploited and amplified by modern digital environments and AI:

Echo Chambers and Reinforcement: People tend to **seek validation within like-minded groups**, and social media algorithms reinforce this by creating "echo chambers" or "filter bubbles". Within these insular communities, users are repeatedly exposed to similar viewpoints and information that aligns with their existing beliefs. This can fortify preconceived misinformation beliefs, making them challenging to counteract, as disinformation often "preaches to the choir".

Social Proof and Familiarity: The "consensus heuristic" or "social proof effect" makes people more likely to share a message if they see that it has already been widely shared by others. Repeated exposure to disinformation materials also increases the likelihood of sharing, even if the content is not explicitly believed. This means that within a community, a false story can gain momentum simply through visibility and perceived popularity.

Targeted Amplification: Modern disinformation campaigns leverage data analytics to "micro-target" specific groups or individuals with tailored false narratives, increasing their persuasive power. This hyper-personalisation exploits cognitive biases like confirmation bias, making it more likely that disinformation will find a receptive audience among those already inclined to believe it, thereby deepening ideological divides and fortifying extreme views within communities.

Weakening of Traditional Institutions: The weakening of traditional social institutions, such as schools, churches, and community organisations, can make individuals more susceptible to disinformation by reducing established sources of trusted information and community cohesion.

How Community Dynamics Strengthen the Fight Against Misinformation

Despite these vulnerabilities, a **strong sense of community and shared purpose** can be the basis for effective grassroots efforts to build collective resilience to misinformation, moving beyond individual efforts.

Collective Resilience Strategies: Communities, such as the ARMY fandom develop and share various strategies to deal with misinformation:

Active Engagement: This includes countering misinformation by providing links to evidence from credible sources, clearing or flooding negative trends with positive keywords, and engaging in dialogue to explain perspectives. Some communities even reach out to journalists to correct misinformation in media coverage.

Disengagement and Distancing: This involves strategies like blocking or unfollowing accounts that spread misinformation, muting phrases that often lead to arguments, or actively removing themselves from information spaces. Communities may also conceal information by using codes or private channels, or distract users by flooding platforms with other information to reduce unwanted attention and minimise engagement with problematic content.

Prioritising Mental Health: Community-based strategies often focus on members' mental health and well-being by providing ways to distance themselves from stressful and triggering content.

Informal Learning and Mentoring: Strategies for navigating misinformation are shared among social groups through informal learning and mentoring, particularly in groups formed around common identities and mutual interests. These foster enhanced information literacy skills within the community, enabling members to research and become more aware of potentially biased or xenophobic media.

Human-Centred Mindset: Nurturing a human-centred mindset, which includes ethical principles like "non-discrimination" and "do no harm," is built upon social and emotional learning processes, requiring conflict-based opinion-taking, social construction, and social interactions [human-centred competencies from previous response]. This approach guides students to understand that AI is human-led and that decisions made by AI creators can impact human rights and agency [human-centred competencies from previous response]. Encouraging critical AI citizenship and promoting social responsibilities in AI societies helps individuals collectively uphold these values.

Integrating Media Literacy and Cybersecurity

Media literacy is essential for combating misinformation. It equips individuals with the skills to critically assess information, recognise signs of misinformation, and evaluate the credibility of sources. While some research suggests that lower digital media literacy is not the sole cause of misinformation sharing, and that some individuals with higher literacy may deliberately share false content for partisan reasons, community-wide media literacy initiatives remain crucial.

Disinformation is increasingly recognised as a **cyber-psychological threat** that targets human perception, beliefs, and trust, rather than just technical systems. Therefore, cybersecurity strategies must adapt to include human-centric approaches alongside technical defences. This involves:

Integrating media literacy into cybersecurity training: This combines critical thinking skills with practical cybersecurity awareness, making individuals less vulnerable to both technical threats and information-based manipulation like phishing or social engineering.

Content Authentication and Transparency: Measures like digital watermarking, provenance tracking, and content credentials help users differentiate between authentic and manipulated content. This "nutrition label" approach for information supports informed decision-making.

Promoting Responsible Digital Citizenship: Media literacy also supports ethical digital citizenship by encouraging users to question information, protect their privacy, and understand the consequences of spreading false content.

Ultimately, combating disinformation requires a **whole-of-society approach**, involving individuals, industry, government, and civil society working in concert. This collaborative effort, coupled with long-term investment in digital literacy and media education, is essential for individuals and communities to better discern truth from disinformation in the evolving information landscape.

Activities for students aged 12-13

Human-Centred Mindset: Understanding Human Agency and Accountability in the AI Era

Competencies & Curricular Goals (CGs): At the "Understand" level, students are expected to recognise that **AI is human-led**, and that decisions made by AI creators significantly impact human rights, human–AI interaction, and society. They should grasp the necessity of **exercising sufficient human control over AI** and understand that AI cannot replace human thinking or intellectual development.

- **"AI Life Cycle and Human Impact" Mapping**
 - **Activity:** Students can **draw concept maps** illustrating the key steps in the life cycle of selected AI tools (e.g., data collection, algorithm design, deployment) and then add how **human decisions at each step profoundly affect the impact of AI**. They should reflect on potential consequences if human agency is lost, such as how biased data can lead to discriminatory AI outputs, which in turn can contribute to disinformation.
 - **Pedagogical Method:** This activity uses **visualisation** to help students grasp the abstract concept of human agency. Encourage them to highlight points where human oversight is crucial to prevent harm or manipulation, linking directly to the cybersecurity concern of AI-generated disinformation exploiting cognitive biases.
 - **Learning Environment:** Can be done with **unplugged settings** like paper-based worksheets or digital concept-mapping applications.
- **"AI's Real Capabilities vs. Hype" Debate**
 - **Activity:** Organise short, age-appropriate **scenario-based debates** on situations where AI is used in daily life (e.g., a "smart" recommendation system vs. a human teacher deciding about a student's learning). Students discuss when AI can support human capabilities and when relying on it might lead to "overhyped claims" or threaten human intellectual development.
 - **Pedagogical Method:** **Conflict-based debates** can nurture critical thinking on the dynamic boundaries between human and machine agency. This helps students understand that AI should **not usurp human thinking processes or high-stakes decisions**, a crucial aspect of resisting disinformation that aims to manipulate perception.
 - **Learning Environment:** Use **pre-downloaded or recorded videos** of AI applications to provide concrete examples for discussion.

Ethics of AI: Practising Safe and Responsible Use

Competencies & Curricular Goals (CGs): Students should develop a **basic understanding of ethical issues around AI**, including its impact on human rights, data privacy, social justice, and environmental sustainability. They should learn to internalise principles such as "do no harm," **non-discrimination**, and **transparency and explainability**...

Suggested Activities:

- **"Ethical Dilemma Detective" Case Studies**
 - **Activity:** Present age-appropriate **real-world or simulated scenarios** (e.g., an AI app that collects too much personal data, or an AI tool that generates content with a subtle bias). Students identify the ethical dilemmas involved, such as potential privacy violations or discriminatory biases, and discuss **why certain AI tools should be viewed with caution or even banned** due to their potential to undermine human rights or agency.
 - **Pedagogical Method:** Through **case studies on controversies**, students can map these issues to core ethical principles like "do no harm," **non-discrimination**, and **data privacy**. This directly addresses cybersecurity risks where disinformation exploits personal data or perpetuates biases.
 - **Learning Environment:** Utilize **unplugged materials** like printed case studies or scenarios, supplemented by **locally available AI tools** on mobile phones for demonstration purposes.
- **"AI for Good" Project**
 - **Activity:** Students research and **validate examples of AI tools that genuinely serve the public good**, focusing on applications that promote equity, inclusion, linguistic and cultural diversity, or environmental sustainability. They can discuss how these "ethical by design" tools compare to those that might be used for disinformation.
 - **Pedagogical Method:** This **searching and validating activity** helps students connect abstract ethical principles to real-world positive applications of AI. It fosters an **understanding of how responsible AI development can counteract the negative impacts of disinformation**.
 - **Learning Environment:** Access to **search engines and online videos** is beneficial for this research, along with simple **digital concept-mapping applications** to organise their findings.
 - Integrating Cybersecurity: Recognising AI's Role in Disinformation
 - **Competencies & Curricular Goals (CGs):** Students should acquire **basic conceptual knowledge on AI** and how AI models are trained, understanding that AI can process vast amounts of information and generate new content. They also need to understand how AI can be misused to spread disinformation.
- **"Fact-Checking AI-Generated Content" Workshop**
 - **Activity:** Provide students with examples of **AI-generated text or images** (clearly labelled as such, with age-appropriate content) alongside authentic content. Students learn to **identify characteristics that might indicate AI generation**, such as overly fluent or stochastic outputs, and practice **critically examining the accuracy** of AI outputs. Discuss how AI's ability to create **hyper-realistic and personalised content** makes disinformation more dangerous.

- o **Pedagogical Method:** This activity provides hands-on practice in **evaluating the trustworthiness** of digital content. It highlights the cybersecurity threat where AI makes disinformation scalable and harder to detect.
- o **Learning Environment:** Use **computers with internet access** to demonstrate AI content generation tools (e.g., simple text generators or image creators, if available and appropriate) and online fact-checking resources
- **"Protecting My Digital Self" Discussion**
 - o **Activity:** Discuss with students how their **personal data online can be collected and used to create targeted, personalised messages**, including disinformation campaigns. Guide them to understand the importance of **data privacy** and taking measures to ensure their data is collected, used, and shared only with **informed consent**.
 - o **Pedagogical Method:** This **discussion-based approach** encourages **self-awareness** and **self-discipline** in digital behaviour, fostering an understanding of how personal actions relate to broader cybersecurity risks.
 - o **Learning Environment:** Can be facilitated using **unplugged worksheets** outlining privacy policies or digital footprint scenarios, or by referencing **locally available smartphone apps** that collect user data.

By implementing these activities, 12-13 year old students can develop the fundamental competencies and a human-centred mindset necessary to critically engage with AI, understand its ethical implications, and effectively contribute to combating disinformation in the evolving digital landscape1....

For students aged 14, activities for fighting disinformation in the age of AI should primarily align with the **'Apply' progression level** within the AI competency framework for students. This level focuses on enabling students to **enhance, transfer, and adapt their learned values, knowledge, and skills to new learning processes**. It involves critically examining more advanced technical methods behind AI tools and habitually applying a human-centred mindset and ethical perspective to the assessment, study, and practical uses of AI. At this age, students should be prepared to become **responsible, active, and effective users of AI**. For students with a strong interest in AI, elements of the 'Create' level, which focuses on developing human-centred solutions and actively crafting AI applications, can also be introduced.

Disinformation in the age of AI is characterised by its **accessibility, efficiency, hyper-realism, personalisation, and scalability**. It can exploit human cognitive biases. Cybersecurity issues intersect with disinformation through threats like **deepfakes and AI-generated content**, as well as concerns around **data privacy** and the use of personal data without consent for training AI models. Disinformation itself can be treated as a cyber-psychological threat, employing tactics similar to cyberattacks.

Here are suggested age-appropriate activities for 14-year-olds, incorporating dimensions of the AI competency framework for students (Human-centred mindset, Ethics of AI, AI techniques and applications, and AI system design) while explicitly addressing disinformation, AI ethics, and cybersecurity:

These activities are designed to be hands-on, problem-based, and encourage critical thinking and discussion, aligning with the 'Apply' level objectives for students.

- **"Deepfake Detective & AI Text Analyst" Challenge**

- **Focus:** AI Techniques and Applications, Ethics of AI (Transparency & Explainability), Cybersecurity (Identifying Threats).
- **Description:** Students act as "digital detectives" to identify and analyse subtle AI-generated manipulations in images, short videos, or news articles, which can be harder to spot. They will learn to look for specific "tells" such as unnatural features, inconsistent speech patterns, or overly perfect prose. Students can be introduced to **AI tools for detection** (e.g., simplified versions of Hive AI or Reality Defender) and discuss their limitations against advanced AI manipulation.
- **Discussion:** Facilitate a discussion on the **ethical implications of creating and spreading deepfakes for disinformation purposes**, highlighting how this can **undermine public trust in all sources of information** – a phenomenon known as the "liar's dividend". They should also critically evaluate whether certain AI tools *should* be used to generate specific types of content, such as fake news or political advertisements.
- **Competencies Addressed:** Students will proficiently operate AI tools and exemplify their techniques and implications. They will apply guidelines to ensure responsible AI use by combating deepfakes and AI-amplified hate speech. This activity will also help them understand that AI-generated content can be stochastic and less trustworthy.

- **"Digital Footprint & Privacy Policy" Design Workshop**

- **Focus:** Ethics of AI (Safe & Responsible Use, Data Privacy), Human-centred mindset (Human Accountability), Cybersecurity (Data Protection).
- **Description:** Students will delve deeper into how their online data is collected, processed, and used by AI systems, often without their full, informed consent.
- **Activity:** Students will research and analyse simplified privacy policies from common online platforms to identify key elements related to data collection, usage, and sharing. Subsequently, they will collaborate to **draft their own "Personal Data Protection Policy" or "Responsible Digital Citizen's Charter"** for online interactions. This charter should specify what personal data should *not* be disclosed in AI prompts or online, and outline strategies to ensure their data is collected, used, and shared only with their deliberate and informed consent. The discussion should highlight **hidden privacy risks, particularly for students with special needs**.

- **Discussion:** Explore the distinction between "safety by design" and "safety by use" in AI. Deliberate on who bears responsibility when data privacy is violated by AI systems: the user, the AI creator, or the service provider.
 - **Competencies Addressed:** Students will develop a deep understanding of AI safety issues, including data ownership, data sovereignty, and data privacy. They will implement measures to safeguard their data privacy, ensuring data is used with consent. This activity reinforces how AI's data mining can exploit personal data, often without consent.
- **"Algorithmic Amplifier" Simulation & Mitigation**
 - **Focus:** AI Techniques and Applications (Application Skills), Human-centred mindset (Social Responsibility), Ethics of AI (Non-discrimination, Proportionality).
 - **Description:** Students will learn how **social media algorithms amplify sensational content, including disinformation**, and how this can create "echo chambers".
 - **Activity:** Conduct a simplified simulation of a social media feed algorithm to show how engagement with certain topics can lead to a reinforcing cycle of similar content, potentially solidifying false beliefs. Discuss **confirmation bias** and its exploitation by personalised synthetic media. Students will then propose **design modifications or user behaviours** to mitigate these effects, such as implementing a "critical thinking prompt" before sharing, or a "diverse news feed" option to encourage seeking varied perspectives.
 - **Discussion:** Explore how **algorithmic bias** can be embedded in AI design, leading to structural exclusion and discrimination, and discuss the responsibility of platforms to address these issues.
 - **Competencies Addressed:** Students will demonstrate an understanding of human accountability in AI deployment, resisting overhyped claims about AI substituting human decision-making. They will learn to identify and mitigate risks while leveraging AI's pedagogical benefits. They will also become mindful of biases in AI tools and their potential to exclude or marginalise.
- **"Ethical AI for Community Impact" Design Project**
 - **Focus:** AI System Design (Architecture Design), Ethics of AI (Ethics by Design), Human-centred mindset (Citizenship in the AI Era).
 - **Description:** This activity encourages students to proactively consider how AI can be designed ethically to benefit society, connecting to the 'Create' level of competency for highly engaged students.
 - **Activity:** In groups, students will **design a conceptual "ethical AI helper"** for a real-world community problem (e.g., an AI for local pollution tracking, or a tool for accessible communication across languages). Their design should explicitly address:
 - **Problem Scoping:** Whether AI *should* be used to solve this problem from legal, ethical, and logical perspectives.

- **Data Acquisition & Bias Mitigation:** How to ensure ethical data collection (consent, privacy) and prevent biases by using diverse and representative data.
 - **Human Accountability & Control:** How humans will retain control over critical decisions and ensure accountability for AI outputs.
 - **Transparency & Explainability:** How users will understand the AI's operations and decisions.
 - **Preventing Misinformation/Misuse:** How the design will prevent the AI from generating or being used to spread disinformation or cause harm.
- **Presentation:** Groups will present their "ethical AI design," justifying their ethical choices and design considerations.
 - **Competencies Addressed:** Students will acquire basic methodological knowledge and technical skills for AI architecture design. They will apply human-centred values and ethical principles in their design considerations. They will also nurture a lifelong learning attitude towards AI to support self-actualisation and societal contribution.
- **"Responsible Digital Citizen" Media Campaign**
 - **Focus:** All aspects, especially Ethics of AI (Safe & Responsible Use), Human-centred mindset (Social Responsibility), and AI Techniques and Applications (Application Skills).
 - **Description:** Students will apply their learning to create a public awareness campaign for their peers or younger students on becoming responsible digital citizens and combating disinformation in the age of AI.
 - **Activity:** Working in teams, students will **design and produce campaign materials** (e.g., short videos, social media posts, posters, or interactive presentations) that explain complex concepts in an accessible way. The campaign should:
 - Explain what AI-generated disinformation (e.g., deepfakes) is and how to spot it.
 - Provide actionable tips for **protecting personal data and privacy online**, particularly in AI interactions.
 - Illustrate how social media algorithms influence content and how to seek diverse information.
 - Promote **critical thinking and verifying information** before sharing.
 - Encourage empathetic communication and self-reflection when encountering disinformation.
 - **Pitch:** Groups will "pitch" their campaign ideas, justifying their messaging and chosen media channels based on their target audience and desired impact.
 - **Competencies Addressed:** Students will internalise ethical rules for responsible AI use, including data privacy and intellectual property rights. They will critically analyse AI's social impact from both global and local

perspectives. This activity reinforces that media literacy and public awareness are crucial for strengthening cyber resilience against disinformation.

These activities will help 14-year-olds deepen their understanding of AI's capabilities and risks, develop critical skills to identify and resist disinformation, and internalise ethical considerations and cybersecurity practices, preparing them to be responsible digital citizens and potential co-creators in the evolving AI era.

Activities for students aged 13-14

For students aged 13 to 14, the focus shifts from a basic understanding of AI and its implications to **applying** that knowledge in practical scenarios, fostering critical thinking, and promoting responsible digital citizenship. This age group corresponds to the "Apply" progression level in the AI competency framework for students (AI CFS). At this level, students are expected to enhance, transfer, and adapt their learned values, knowledge, and skills to more complex contexts, critically examining advanced technical methods behind AI tools and applying a human-centred and ethical perspective to AI use.

Combating disinformation in the age of AI for this age group necessitates a deeper dive into how AI is designed and used to generate and spread false content, coupled with robust cybersecurity awareness to protect personal data and digital integrity. Disinformation is fundamentally a cyber-psychological threat, targeting human perception, beliefs, and trust, often leveraging AI and social media algorithms for rapid, widespread distribution.

Here are age-appropriate activities, taking into consideration needed competencies, curricular goals, suggested pedagogical methods, and learning environments, to help students fight disinformation with a human-centred mindset and a strong focus on cybersecurity issues:

1. Human-Centred Mindset: Human Accountability in the AI Era

Needed Competencies & Curricular Goals (CGs): At the "Apply" level, students should **deepen their understanding of human accountability** as a legal obligation for AI creators and service providers and recognise their own responsibility when using AI to assist decisions that affect humanity. They should also develop resilience against "overhyped claims" that suggest AI can completely replace human thinking or decision-making.

Suggested Activities:

- **"AI in Decision-Making: Who's Accountable?" Case Studies and Debates**
 - **Activity:** Present students with real-world or simulated scenarios where AI is used to make decisions (e.g., an AI system assessing university applications, an AI-powered news aggregator that prioritises certain narratives, or an AI tool used in medical diagnosis). Students will **investigate the roles of humans and AI** in these decision loops and discuss **who bears the legal and ethical accountability** for the outcomes. They should consider how AI-generated disinformation could manipulate these decision processes and impact human rights or fairness.
 - **Pedagogical Method:** Utilise **scenario-based practices and debates** to explore critical questions about human accountability and AI's genuine capabilities. This helps students understand that AI should not

usurp human thinking processes or high-stakes decisions, particularly

in fields that affect individuals deeply. Students can **"design an 'ethics kit'"** for self-disciplined and responsible AI use, which can include personal checks for accountability when interacting with AI systems.

- **Learning Environment:** This can be facilitated through **unplugged scenarios**, online research, and group discussions. Access to case studies (print or video) of AI ethics incidents can provide concrete examples. Students could use **concept-mapping tools** (digital or paper-based) to visualise key duty-bearers and their roles in the AI lifecycle.
- **"Debunking AI Hype and Its Disinformation Potential" Workshop**
 - **Activity:** Students will **analyse media reports or online content that "overhype" AI's capabilities** (e.g., claims of AI achieving sentience, or fully automating complex human tasks) versus its actual limitations, particularly concerning its ability to understand the real world or make value judgments. They will then connect this hype to how it can be exploited by disinformation campaigns to mislead or manipulate public opinion, focusing on how AI-generated hyper-realistic content can be used to "preach to the choir" and harden false beliefs.
 - **Pedagogical Method:** Engage students in **critical examination and debate** about AI's real versus perceived capabilities. Encourage them to outline concrete actions to protect themselves and peers from AI outputs that might undermine human thought or critical thinking. This directly addresses the cybersecurity concern of AI-generated content exploiting cognitive biases.
 - **Learning Environment:** Use **online news articles, social media posts, and videos** as examples of AI hype and disinformation. Students can use **digital presentation tools** to present their findings and arguments.

2. Ethics of AI: Safe and Responsible Use

Needed Competencies & Curricular Goals (CGs): Students should **internalise essential ethical rules for the safe and responsible use of AI**, including respecting data privacy, intellectual property rights, and other legal frameworks. They must understand the risks of disclosing personal data and take measures to ensure data is collected, used, shared, archived, and deleted with their informed consent.

Suggested Activities:

- **"Digital Footprint and Data Privacy" Investigation**
 - **Activity:** Students will **investigate how AI systems collect and use personal data** from their online activities (e.g., social media, search engines, apps), and how this data can be leveraged to create targeted, personalised messages, including disinformation campaigns. They will research and discuss the importance of **informed consent** for data

collection and explore practical steps to safeguard their privacy. This includes understanding **"hidden risks"** of disclosing data, especially for vulnerable groups.

- **Pedagogical Method:** Facilitate **user reviews of AI creators' policies on data privacy**, encouraging students to compare them against relevant regulations (e.g., GDPR principles for data protection). Conduct **"simulation of typical AI incidents and risk management"** to familiarise students with precautionary and interactive strategies for safe AI use. This connects directly to cybersecurity practices of data protection.
- **Learning Environment:** Use **pre-downloaded examples of privacy policies** of popular online services or apps. Students can use digital tools or worksheets to map out their own digital footprint and identify potential data vulnerabilities.
- **"Identifying AI-Generated Disinformation and Deepfakes" Workshop**
 - **Activity:** Provide students with various examples of **AI-generated content** (text, images, audio, video – deepfakes) alongside authentic content, ensuring age-appropriateness. Students will learn to **identify characteristics that indicate AI generation** (e.g., anomalies in images/video, stochastic or overly fluent text, emotional cues in generated audio/text). They will then apply **fact-checking techniques** and discuss how AI's ability to create "hyper-realistic" and "personalised" content makes disinformation more dangerous and harder to detect. They should also discuss the **legal and ethical principles** of respecting copyright for AI-generated content.
 - **Pedagogical Method:** This activity provides **hands-on practice in evaluating the trustworthiness of digital content**. It highlights the cybersecurity threat where AI makes disinformation scalable and harder to detect. Students can draft an **"iteratively updated list of dos and don'ts"** for responsible AI use and explain legal principles to peers.
 - **Learning Environment:** Use **computers with internet access** to access and analyse various forms of digital content. Utilise **online fact-checking resources** and, if appropriate and available, simple AI content generation tools (e.g., text or image generators) for demonstration purposes [a general knowledge point outside the sources but directly supports the activity].

3. AI Techniques and Applications: Application Skills

Needed Competencies & Curricular Goals (CGs): Students should **construct an age-appropriate understanding of data, AI algorithms, and programming**, and acquire **transferable application skills** to critically evaluate and leverage open-source AI tools, programming libraries, and datasets. They need to understand how AI models are trained and how they process data to generate outputs.

Suggested Activities:

- **"Exploring Algorithmic Bias" Data Lab**
 - **Activity:** Provide students with simplified, age-appropriate datasets that contain **inherent biases** (e.g., disproportionate representation of certain demographics in image recognition data, or skewed historical data leading to biased predictions). Using simple data analysis tools (e.g., spreadsheet software or visual programming tools), students will **experiment with how these biases can influence AI outputs**. They will then discuss how such algorithmic biases can contribute to discrimination and the spread of disinformation by reinforcing stereotypes or excluding certain groups.
 - **Pedagogical Method:** This is a **"data biases lab"** where students gain hands-on experience in identifying and potentially mitigating biases in data, connecting directly to the principle of non-discrimination. It encourages "informed whistleblowing" by enabling students to investigate biases in datasets and report ethical risks.
 - **Learning Environment:** **Computers with internet access** are crucial for accessing sample datasets and simple data analysis or visual programming tools.
- **"AI and Information Flow" Analysis Project**
 - **Activity:** Students will research and **analyse how social media algorithms (AI-driven)** contribute to the rapid spread of information, including disinformation, by maximising user engagement and fostering "echo chambers". They will identify techniques used by malicious actors, such as "bots" and "microtargeting", and investigate how AI allows for rapid content creation and mass production of fake content. They can then propose strategies to mitigate these effects, such as algorithmic downranking or early warning prompts.
 - **Pedagogical Method:** This involves **research-based learning and critical analysis** of current information ecosystems. Students will "visually represent how selected AI systems work". It addresses the need to understand the systemic basis of disinformation, beyond just fact-checking.
 - **Learning Environment:** **Computers with internet access** are essential for researching social media algorithms, bot activities, and targeted influence operations. They can use **digital presentation or concept mapping tools** to summarise their findings.

4. AI System Design: Architecture Design

Needed Competencies & Curricular Goals (CGs): Students should **cultivate basic methodological knowledge and technical skills to configure a scalable, maintainable, and reusable architecture for an AI system**, covering layers of data, algorithms, models, and application interfaces. This includes applying human-centred values and ethical principles in their configuration.

Suggested Activities:

- **"Designing an Ethical AI Application" Prototype Project**
 - **Activity:** In small groups, students will brainstorm a real-world problem that AI *could* solve in an ethical and human-centred way (e.g., an AI tool for community support, or an accessible learning tool for students with disabilities). They will then **"simulate the problem-scoping and justification for the design of a new AI system"**, outlining the problem, defining its boundaries, goals, and constraints, and considering the ethical implications and data privacy at each stage. They should also consider the environmental impact of AI model training. They will then design a simple **"prototype architecture"** for their proposed AI solution, focusing on integrating "ethics by design" principles. This could be a flowchart, pseudocode, or a visual diagram.
 - **Pedagogical Method:** This is a **project-based learning** activity, fostering "engineering thinking" and practical skills in AI system design. It encourages students to "solidify multidisciplinary foundation for AI" by integrating knowledge from science, technology, engineering, and mathematics. The activity enables students to "apply deepened human-centred values and ethical principles in their configuration, construction and optimization".
 - **Learning Environment:** Can be done with **unplugged materials** (whiteboards, large paper, markers) for collaborative design and prototyping. Digital drawing tools or simple programming environments (if available) can also be used to create architecture diagrams.
- **"AI for Good: Counter-Disinformation Tool" Concept Development**
 - **Activity:** Building on their understanding of disinformation tactics, students will **design a concept for an AI-powered tool that helps combat misinformation** (e.g., an AI-assisted fact-checking tool, a bias detector for news articles, or an image/video authenticity checker). They will identify the types of data needed, the AI techniques involved (e.g., NLP, computer vision), and how the tool would promote transparency and help users discern authentic from manipulated content. They should also consider potential misuse of their tool and ethical "guardrails".
 - **Pedagogical Method:** This activity allows students to **"apply their interdisciplinary knowledge and practical methods"** to a real-world challenge. It fosters creative problem-solving and an understanding of how AI can be leveraged for positive societal impact, aligning with the human-centred approach. It encourages them to consider the "proportionality" of AI solutions.
 - **Learning Environment:** Access to **computers and internet research** is crucial. Students can use digital presentation tools to share their concepts. Discussions can refer to existing AI detection tools (e.g., Hive AI, Sensity AI, GPTZero) as inspiration.

By engaging in these activities, students aged 13-14 will develop advanced competencies in critically assessing AI, understanding its ethical implications, and



actively contributing to combating disinformation within a human-centred and cybersecurity-aware framework.



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Activities for students aged 14-16

For students aged 14 to 15, fostering competencies to combat disinformation in the age of Artificial Intelligence (AI) requires a human-centred approach, integrating media literacy with an understanding of AI's technical, ethical, and societal implications, including cybersecurity issues. This age group aligns with the 'Apply' progression level in the AI competency framework for students, with opportunities to engage in 'Create' level activities if they have strong interest and ability.

Needed Competencies for Students Aged 14-15

Students in this age range should develop the following core competencies to effectively fight disinformation in an AI-saturated world:

- **Human-centred mindset:** This involves understanding that AI is **human-led**, and the decisions of its creators significantly influence human rights and agency. Students should cultivate a critical capacity to assess AI's genuine capabilities versus overhyped claims, particularly when it is used to assist high-stakes decisions. They should also understand their social responsibilities as citizens in an AI society, promoting AI design and use for human welfare, inclusion, and social justice.
- **Ethics of AI:** Students need to internalize essential ethical principles for the **safe and responsible use of AI**, including data privacy, intellectual property rights, and avoiding harmful content. This extends to understanding and applying an 'ethics-by-design' approach, where ethical considerations are embedded from the conceptualization stage of AI systems.
- **AI techniques and applications:** This covers acquiring foundational conceptual knowledge on how AI models are trained, understanding data and algorithms, and developing transferable skills to critically evaluate, select, and even customize AI tools. This knowledge is crucial for discerning manipulated content.
- **Critical Thinking and Media Literacy:** Students must learn to critically evaluate information, identify biases, question credibility, and apply fact-checking techniques, especially given AI's ability to generate hyper-realistic disinformation. They should recognize propaganda and understand how AI-generated content can exploit human cognitive biases.
- **Cybersecurity Awareness:** Given that disinformation is increasingly treated as a cybersecurity threat, students should understand how AI and digital technologies contribute to its rapid spread and how to strengthen human resilience against it. This includes understanding the risks of disclosing personal data and the importance of content authentication.

Curricular Goals

AI curricula for students aged 14-15 should aim to enable them to:

- **Critically analyse AI's societal impact:** Evaluate how AI affects education, work, interpersonal interaction, and connections with the environment, and contribute to policies that leverage AI's benefits while mitigating risks.

- **Champion ethical AI practices:** Understand and comply with regulations and actively participate in co-creating ethical standards for AI use, addressing socio-cultural and environmental concerns.
- **Demonstrate human accountability:** Recognize that human accountability is a legal and social responsibility when using AI, particularly for high-stakes decisions, and resist the use of AI to usurp human thought or intellectual development.
- **Apply AI knowledge to detect manipulation:** Understand how AI systems are developed (data, algorithms) and how deepfakes, AI-generated text, and other synthetic media are created, allowing them to better identify manipulated content.
- **Develop strategies for safe digital engagement:** Learn and practice measures to safeguard personal data and privacy and understand how to navigate online platforms responsibly to reduce the spread of misinformation.

Suggested Pedagogical Methods and Activities

Learning activities should be engaging, interactive, and problem-based, fostering critical thinking and active participation:

- **Scenario-based Ethical Dilemmas and Debates:**
 - **Activity:** Present students with real-world or simulated scenarios involving AI-generated disinformation (e.g., a deepfake video of a politician, AI-written fake news article on climate change). Guide discussions on the ethical dilemmas posed, such as data privacy vs. content virality, or profit-driven algorithms vs. human well-being.
 - **Goal:** Help students understand the reasons behind ethical conflicts, develop "perspective taking" in ethical dilemmas, and internalize principles like 'do no harm' and human determination.
- **Human Accountability and Agency Analysis:**
 - **Activity:** Conduct a mock "AI Act courtroom debate" where students act as jurors evaluating hypothetical AI systems (e.g., an AI used for student assessment or a social media algorithm) that could undermine human agency or privacy. They would deliberate on the creators' intent and the potential harm caused.
 - **Goal:** Reinforce the understanding that AI is human-led and that human accountability is a legal and social obligation, especially for high-stakes decisions.
- **"Ethics Kit" Design for Responsible AI Use:**
 - **Activity:** Task students to design a personal or classroom "ethics kit" that users can habitually check when interacting with AI. This kit should include guidelines for respecting data privacy, intellectual property rights, and verifying AI-generated content (e.g., clearly marking AI-produced text, avoiding misinformation).

- **Goal:** Promote self-awareness and self-discipline in the response of AI, habituating compliance with ethical principles and applicable regulations.
- **Data Biases and Algorithmic Impact Lab:**
 - **Activity:** Provide students with sample datasets (some with embedded biases, e.g., gender or ethnic imbalances) and guide them to experiment with how these biases impact AI model outputs (e.g., image classification or content generation). Students then practice basic data engineering skills to identify and mitigate these biases.
 - **Goal:** Deepen understanding of how AI models are trained, how biases can be embedded, and how they contribute to discrimination or disinformation, thereby fostering an 'ethics-by-design' mindset.
- **AI Disinformation Detection & Mitigation Project:**
 - **Activity:** Organize a project where students research and present on how AI tools (e.g., deepfake generators, large language models) are used to create disinformation. They then explore and perhaps even test AI-driven detection tools (e.g., reverse image search, content authentication mechanisms). They can also design public awareness campaigns or "inoculation games" to teach peers about these tactics.
 - **Goal:** Enhance practical verification skills, critical analysis of AI's capabilities and limitations, and foster proactive behaviours in combating misinformation.
- **Community-Based Misinformation Strategies:**
 - **Activity:** Students can analyse case studies of how online communities (e.g., fandoms) have successfully developed grassroots strategies to combat misinformation among their members, focusing on aspects like collective resilience, shared purpose, and mental health considerations. They could then brainstorm how these community-based tactics could be applied in their school or local community.
 - **Goal:** Highlight the role of social groups and user agency beyond individual fact-checking, promoting collaborative vigilance and support.

Learning Environments

To support these activities, a blend of learning environments is recommended:

- **Unplugged Settings:** Utilize paper-based articles, case studies, and worksheets for initial discussions and conceptual mapping of human agency and ethical principles, encouraging independent critical thought away from digital distractions.
- **Digital Devices with Internet Access:** Provide computers, tablets, or smartphones with reliable internet connectivity. This is essential for accessing:
 - **Online AI Tools:** Such as generative AI models, image/video creators, and tools for basic AI programming or data analysis.

- **Open-Source Resources:** Open-source AI programming libraries (e.g., TensorFlow, PyTorch, Keras), public datasets (e.g., MNIST), and data analytics tools.
- **Collaborative Platforms:** Online platforms (e.g., GitHub, forum groups) to facilitate peer learning, resource sharing, and co-creation projects.
- **Reference Materials:** Websites sharing AI regulations, privacy policies, and case studies of legal or ethical issues related to AI and disinformation.
- **Simulated Project Environments:** For activities involving AI system design, ethical auditing, or performance testing, provide access to simulated or simplified AI development environments, which can be locally hosted or cloud-based.
- **Access to Relevant Policies and Guidelines:** Ensure students have access to age-appropriate interpretations of international recommendations (like UNESCO's Recommendation on the Ethics of AI) and national/local regulations concerning AI and data governance.

By implementing these strategies, students can be empowered not only to navigate the complex information landscape of the AI era but also to become responsible and proactive contributors to a more ethical and human-centred digital future.

For students between ages 16 and 17, addressing disinformation in the age of AI requires an advanced, human-centred approach, aligning with the **"Create" progression level** within the AI competency framework for students. At this level, students are expected to become conscientious AI co-creators, contributing to ethical design and critically assessing AI's societal implications, which directly relates to combating disinformation and understanding cybersecurity issues.

Needed Competencies

Students aged 16-17 should develop competencies that enable them to actively participate in shaping a responsible AI future and countering sophisticated disinformation. These competencies fall under four key aspects:

- **Human-centred mindset (Citizenship in the AI era):** Students should be able to **critically evaluate the impact of AI on human societies** and advocate for its design and use to enhance human welfare, inclusion, and social justice. This includes understanding how profit-driven AI providers might threaten social and emotional well-being by reinforcing addiction and isolation. They should be able to reflect on desirable social relations and social cohesion in the AI era and contribute to policies defining citizen rights and obligations.
- **Ethics of AI (Ethics by design):** Students are expected to **adopt an 'ethics-by-design' approach** to AI tools, meaning they assess and ensure ethical principles are embedded from the conceptualization stage through to testing and use. They should be able to critically analyse the social impact of AI, including its potential to exacerbate discrimination, threaten linguistic/cultural diversity, and impact climate change. This also involves understanding and contributing to the adaptation of AI regulations.
- **AI techniques and applications (Creating AI tools):** Students should possess **advanced skills in data and algorithms** to customize existing AI toolkits or craft new task-based AI tools. This includes integrating human-centred and ethical considerations into their assessment of existing AI resources and testing of self-created tools. They should develop social and emotional skills like adaptivity, complex communication, and teamwork for AI creation.
- **AI system design (Iteration and feedback loops):** This involves **comprehensive engineering skills** for problem scoping, architecture building, training, testing, and optimization of AI systems, with a strong emphasis on **'ethics by design'**. Students should critically evaluate an AI model's impact on users, societies, and the environment, and be able to make informed decisions on optimization, reconfiguration, or even shutting down systems if they violate human rights or cause harm.

For this age group, curricular goals should empower students to:

- **Become critical AI citizens:** Develop an evidence-based understanding of AI's pervasive adoption and its challenges, such as balancing innovation with safety and inclusivity, and critiquing AI-amplified biases and their effects on social relationships, norms, and structures.
- **Champion ethical AI practices:** Actively participate in, and contribute to, the co-creation of ethical standards and regulations for AI use in education and broader society, addressing sociocultural and environmental concerns from design to deployment.
- **Develop and deploy human-centred AI solutions:** Apply advanced knowledge and skills in data, algorithms, and programming to customize or create AI tools that address real-world challenges, such as promoting accessibility or climate-friendly actions, while prioritizing human welfare and social justice.
- **Understand and mitigate AI-driven disinformation as a cybersecurity threat:** Gain insight into how AI enables the scalability, personalization, and emotional resonance of disinformation. Recognize that disinformation targets human perception and trust, similar to cyberattacks exploiting vulnerabilities. Understand how deepfakes and synthetic media are created and diffused, and how they exploit cognitive biases like confirmation bias.
- **Strengthen human resilience to disinformation:** Learn and apply multi-layered risk mitigation strategies for disinformation that integrate technological, educational, and collaborative approaches. This includes understanding content authentication, digital watermarking, and forensic analysis as technical countermeasures, alongside media literacy as a human defence.

Suggested Pedagogical Methods

Pedagogical methods should be highly interactive, project-based, and promote critical inquiry and collaborative problem-solving, reflecting the "Create" level's emphasis on active co-creation.

- **Simulating Due Diligence of a "Chief Ethics Officer":** Students can act as a "chief ethics officer" in a hypothetical AI development team, drafting ethical checklists for auditing AI system design, focusing on anti-bias measures, data collection ethics, and inclusive testing. This helps them understand "ethics by design" from a practical, accountable perspective.
- **Designing an "Ethics Label" Audit for AI Tools:** Provide students with a framework (akin to a nutrition label for food items) to audit the ethical intent of AI system designers, going beyond published statements to uncover hidden purposes and potential biases. This can involve analysing privacy policies and regulations.
- **"AI Hackathons" for Human-Centred Solutions:** Organize hackathons where students customize or create AI tools to solve real-world problems with

a human-centred and ethical approach, such as designing tools for accessibility for people with disabilities or promoting climate education. This fosters adaptability, resilience, and teamwork.

- **Simulating Iteration and Feedback Loops for AI Systems:** Students can simulate the roles of AI engineers to interpret testing results and user feedback, making decisions on optimizing, reconfiguring, or even shutting down an AI model if it violates human rights or harms vulnerable groups. This emphasizes corporate social responsibility and continuous improvement.
- **Conflict-Based Debates on AI's Societal Impact:** Engage students in debates or research-based learning on how AI affects education, work, interpersonal interactions, and environmental well-being. For example, discussing how profit-driven AI threatens social-emotional well-being or exacerbates climate change. This cultivates critical understanding of societal implications and civic responsibilities.
- **Media Literacy and "Inoculation Games":** Utilize interactive tools and games to teach students to recognize common tactics of misinformation, deepfakes, and AI-amplified hate speech. This helps them develop critical thinking skills and resistance to false narratives before exposure.
- **Community-Based Misinformation Strategies Analysis:** Explore case studies of how online communities, such as fandoms, have developed grassroots strategies to combat misinformation among their members, focusing on collective resilience, shared purpose, and mental health considerations. Students can then brainstorm how these tactics might be applied in their own school or local communities.

Learning Environments

The "Create" level requires sophisticated learning environments that support advanced technical work, ethical reflection, and collaborative projects.

- **Digital Devices with Robust Internet Access:** Provide computers, tablets, or smartphones with high-speed internet to access online AI tools, collaborative platforms, and large datasets.
- **Access to Open-Source AI Resources:** This includes free and/or open-source online datasets (e.g., MNIST, CIFAR, ImageNet), AI programming libraries (e.g., Teachable Machine, PyTorch, Keras), and data analytics tools.
- **Locally Hosted or Cloud Computing Resources:** Provide access to computational resources for training and testing AI models, such as school servers or accessible cloud computing platforms (e.g., Hadoop, Spark).
- **Collaborative Platforms:** Utilize online platforms (e.g., GitHub, forum groups) to facilitate peer learning, resource sharing, and co-creation projects among students and with the wider AI community.
- **Access to Legal and Ethical Frameworks:** Ensure students have access to relevant policy documents, regulations (e.g., EU AI Act, UNESCO's Recommendation on the Ethics of AI), and case studies of legal/ethical issues related to AI and disinformation.

- **Simulated Project Environments:** For activities involving AI system development, ethical auditing, or performance testing, provide simulated or simplified AI development environments.
- **Blend of Online and Unplugged Settings:** While advanced technical work requires digital tools, unplugged activities (e.g., paper-based case studies, concept mapping, role-playing debates) remain crucial for fostering independent critical thinking and conceptual understanding away from algorithm-controlled information cocoons.

By integrating these competencies, curricular goals, pedagogical methods, and learning environments, students aged 16-17 can develop a sophisticated understanding of AI, its ethical implications, and practical skills to actively combat disinformation and enhance cybersecurity in an increasingly AI-driven world.

Activities for students aged 17-18

For students aged 17 to 18, activities should align with the **‘Create’ progression level** within the AI competency framework for students. At this advanced stage, students are encouraged to become **conscientious AI co-creators**, critically evaluating AI's societal implications and contributing to ethical design, which is crucial for combating disinformation and understanding cybersecurity challenges.

Needed Competencies

Students in this age group should develop sophisticated competencies that empower them to actively shape a responsible AI future and counteract complex disinformation campaigns. These include:

- **Human-centred mindset (Citizenship in the AI era):** Students should be able to **critically evaluate AI's impact on human societies** and advocate for its design and use to enhance human welfare, inclusion, and social justice. This involves understanding how profit-driven AI can reinforce individual addiction and isolation, weakening social values and cohesion. They should also reflect on desirable social relations and contribute to policies defining citizen rights and obligations in the AI era.
- **Ethics of AI (Ethics by design):** Students are expected to **adopt an 'ethics-by-design' approach** to AI tools, embedding ethical principles from the conceptualization stage through to testing and use. They must critically analyse the social impact of AI, including its potential to exacerbate discrimination, threaten linguistic/cultural diversity, and impact climate change. Furthermore, they should contribute to the adaptation of AI regulations.
- **AI techniques and applications (Creating AI tools):** Students should possess **advanced skills in data and algorithms** to customize existing AI toolkits or craft new task-based AI tools. This includes integrating human-centred and ethical considerations into their assessment of existing AI resources and testing of self-created tools. They are also expected to develop social and emotional skills such as adaptivity, complex communication, and teamwork for AI creation.
- **AI system design (Iteration and feedback loops):** This involves comprehensive engineering skills for problem scoping, architecture building, training, testing, and optimization of AI systems, with a strong emphasis on **'ethics by design'**. Students should critically evaluate an AI model's impact on users, societies, and the environment, and be able to make informed decisions on optimization, reconfiguration, or even shutting down systems if they violate human rights or cause harm.

Curricular Goals

For this age group, curricular goals should empower students to:

- **Become critical AI citizens:** Develop an evidence-based understanding of AI's pervasive adoption and its challenges, such as balancing innovation with

safety and inclusivity. This includes critiquing AI-amplified biases and their effects on social relationships, norms, and structures.

- **Champion ethical AI practices:** Actively participate in, and contribute to, the **co-creation of ethical standards and regulations** for AI use in education and broader society. This involves addressing sociocultural and environmental concerns from design to deployment.
- **Develop and deploy human-centred AI solutions:** Apply advanced knowledge and skills in data, algorithms, and programming to customize or create AI tools that address real-world challenges, such as promoting accessibility or climate-friendly actions, while prioritizing human welfare and social justice.
- **Understand and mitigate AI-driven disinformation as a cybersecurity threat:** Gain insight into how **AI enables the scalability, personalization, and emotional resonance of disinformation**. Recognize that disinformation targets human perception and trust, like cyberattacks exploiting vulnerabilities. Understand how deepfakes and synthetic media are created and diffused, and how they exploit cognitive biases like confirmation bias.
- **Strengthen human resilience to disinformation:** Learn and apply multi-layered risk mitigation strategies for disinformation that integrate **technological, educational, and collaborative approaches**. This includes understanding **content authentication, digital watermarking, and forensic analysis** as technical countermeasures, alongside **media literacy** as a human defence.

Suggested Pedagogical Methods

Pedagogical methods should be highly interactive, project-based, and promote critical inquiry and collaborative problem-solving, reflecting the "Create" level's emphasis on active co-creation.

- **Simulating Due Diligence of a "Chief Ethics Officer":** Students can act as a "chief ethics officer" in a hypothetical AI development team, drafting ethical checklists for auditing AI system design, focusing on anti-bias measures, data collection ethics, and inclusive testing.
- **Designing an "Ethics Label" Audit for AI Tools:** Provide students with a framework (akin to a nutrition label for food) to audit the ethical intent of AI system designers, analysing privacy policies and regulations to uncover hidden purposes and potential biases.
- **"AI Hackathons" for Human-Centred Solutions:** Organise hackathons where students customize or create AI tools to solve real-world problems with a human-centred and ethical approach, such as designing tools for accessibility for people with disabilities or promoting climate education. This fosters adaptivity, resilience, and teamwork.
- **Simulating Iteration and Feedback Loops for AI Systems:** Students can simulate the roles of AI engineers to interpret testing results and user feedback, making decisions on optimizing, reconfiguring, or even shutting down an AI model if it violates human rights or harms vulnerable groups.

- **Conflict-Based Debates on AI's Societal Impact:** Engage students in debates or research-based learning on how AI affects education, work, interpersonal interactions, and environmental well-being, for example, discussing how profit-driven AI threatens social-emotional well-being or exacerbates climate change.
- **Media Literacy and "Inoculation Games":** Utilize interactive tools and games, such as "Bad News", to teach students to recognise common tactics of misinformation, deepfakes, and AI-amplified hate speech, helping them develop critical thinking skills and resistance to false narratives before exposure.
- **Community-Based Misinformation Strategies Analysis:** Explore case studies of how online communities, such as fandoms like the BTS ARMY, have developed grassroots strategies to combat misinformation among their members, focusing on collective resilience, shared purpose, and mental health considerations. Students can then brainstorm how these tactics might be applied in their own school or local communities.
- **Debating AI-generated Content Ownership and Ethical Guidelines:** Organize debates on the ownership of content created using AI and the applicability of copyright regulations to intellectual work that integrates AI-generated content. Students can co-create ethical guidance for themselves and their peers on the responsible use of AI systems like video-recommendation platforms or generative AI.
- **Problem-based learning on Data Biases:** Provide students with sample datasets (with and without outliers) to conduct hands-on experiments on how these affect AI model performance. Guide them to acquire age-appropriate skills in data engineering to remove identifiable biases, comparing results to understand the impact.

Learning Environments

The "Create" level requires sophisticated learning environments that support advanced technical work, ethical reflection, and collaborative projects.

- **Digital Devices with Robust Internet Access:** Provide computers, tablets, or smartphones with high-speed internet to access online AI tools, collaborative platforms, and large datasets.
- **Access to Open-Source AI Resources:** This includes free and/or open-source online datasets (e.g., MNIST, CIFAR, ImageNet), AI programming libraries (e.g., Teachable Machine, PyTorch, Keras), and data analytics tools.
- **Locally Hosted or Cloud Computing Resources:** Provide access to computational resources for training and testing AI models, such as school servers or accessible cloud computing platforms (e.g., Hadoop, Spark).
- **Collaborative Platforms:** Utilize online platforms (e.g., GitHub, forum groups) to facilitate peer learning, resource sharing, and co-creation projects among students and with the wider AI community.
- **Access to Legal and Ethical Frameworks:** Ensure students have access to relevant policy documents, regulations (e.g., EU AI Act, UNESCO's

Recommendation on the Ethics of AI), and case studies of legal/ethics related to AI and disinformation.

- **Simulated Project Environments:** For activities involving AI system design, ethical auditing, or performance testing, provide simulated or simplified AI development environments.
- **Blend of Online and Unplugged Settings:** While advanced technical work requires digital tools, unplugged activities (e.g., paper-based case studies, concept mapping, role-playing debates) remain crucial for fostering

independent critical thinking and conceptual understanding away from algorithm-controlled information cocoons.

These comprehensive activities aim to equip students aged 17-18 with the advanced knowledge, skills, and ethical grounding needed to navigate and positively influence the complex landscape of AI-driven disinformation and cybersecurity.

Activities for students aged 18

For students aged 18, activities fighting disinformation in the age of AI should primarily align with the **'Create' progression level** within the AI competency framework for students. At this level, students are expected to become **conscientious AI co-creators**, developing human-centred solutions to positively impact the design and use of AI. This involves actively crafting AI applications and deliberating on the adaptation of AI regulations. Students are encouraged to "reinforce their interest in AI innovation and develop new AI tools based on open-source and/or customizable datasets, programming tools or AI models". They should also "enhance their capacity to critically assess the social implications of AI and to personalize the responsibilities of being a citizen in AI-driven societies". Disinformation in the age of AI is characterized by its accessibility, efficiency, hyper-realism, personalization, and scalability, and can exploit human cognitive biases. AI-generated content is more likely to be stochastic and potentially less trustworthy, especially for factual knowledge. Cybersecurity issues intersect with disinformation, as disinformation itself can be treated as a cyber-psychological threat, often employing tactics similar to cyberattacks, such as flooding platforms with false information (akin to DDoS attacks) or using deepfakes and manipulated data. Strengthening human resilience against disinformation requires media literacy and public awareness.

Here are suggested age-appropriate activities for 18-year-olds, integrating the four dimensions of the AI competency framework for students (Human-centred mindset, Ethics of AI, AI techniques and applications, and AI system design), while explicitly addressing disinformation, AI ethics, and cybersecurity issues:

These activities are designed to be hands-on, problem-based, and encourage critical thinking, advanced design, and in-depth ethical and technical discussion, aligning with the 'Create' level objectives.

- **"AI Disinformation Counter-Measures Lab"**
 - **Focus:** AI Techniques and Applications (Creating AI tools), AI System Design (Architecture design, Iteration and feedback loops), Cybersecurity (Leveraging Advanced Technologies).
 - **Description:** Students will work in teams to **design, develop, and prototype AI-powered tools or interventions specifically aimed at detecting or mitigating synthetic disinformation**. Possible projects include:
 - **Developing simplified AI-based detection models:** Using publicly available open-source AI programming libraries (e.g., TensorFlow, PyTorch) and datasets, students can train a model to identify signs of deepfakes (e.g., inconsistencies in facial movements, speech patterns) or AI-generated text based on linguistic markers. They should incorporate principles of **"ethical labelling"** for AI-generated content, akin to a "nutrition label" for information, to enhance users' critical thinking.
 - **Prototyping content authentication mechanisms:** Students can research and conceptualize how blockchain-based provenance tracking or

digital watermarking could be implemented to verify the authenticity of digital media content.

- **Designing "virality circuit breakers" or "nudges":** Students could simulate or conceptualize algorithmic adjustments that could detect and downrank sensational or flagged content to prevent its rapid spread, addressing how social media algorithms amplify disinformation.
- **Discussion:** Facilitate a discussion on the **ethical implications** of using AI for detection, such as the potential for false positives, risks to free speech, or the need for transparency in detection models. Explore the concept of the **"liar's dividend"**, where broad public scepticism around deepfakes can be weaponized to discredit genuine evidence, and how effective detection tools can help restore public trust.
- **Competencies Addressed:** Students will "proficiently customize or modify AI tools, applying enhanced conceptual knowledge and skills to create AI-assisted inclusive learning environments". They will "enhance and apply their interdisciplinary knowledge and practical methods to evaluate the appropriateness and methodological robustness of an AI model". This activity directly addresses cybersecurity by "leveraging advanced technologies" for disinformation detection.
- **"Ethical AI Policy Hackathon for Disinformation Governance"**
 - **Focus:** Ethics of AI (Ethics by design, Co-creating ethical rules), Human-centred mindset (Citizenship in the AI era), AI System Design (Problem scoping).
 - **Description:** Students, acting as "AI ethics advisors" or "policy-makers," will identify a specific ethical challenge related to AI disinformation (e.g., hyper-personalized disinformation exploiting cognitive biases, data privacy violations in AI training, algorithmic bias leading to discrimination or structural exclusion). They will then:
 - **Research existing international and national regulations** (e.g., UNESCO's Recommendation on the Ethics of Artificial Intelligence, the EU AI Act).
 - **Propose new or adapted ethical guidelines or policy recommendations** for AI design and use to combat this specific disinformation threat. This can involve outlining concrete "ethics-by-design" principles for new AI platforms or social media algorithms.
 - Students could simulate the **"due diligence of a 'chief ethics officer'"** or use an "ethics matrix" to review existing regulations, identifying gaps or areas for adaptation. They should consider the responsibilities of multiple stakeholders: governmental regulatory agencies, providers of AI systems, institutional users, and individual users.
 - **Discussion:** Emphasize the importance of **human accountability and control** over AI decisions, ensuring AI tools do not replace human thinking or

decision-making, particularly in high-stakes situations. Discuss the delicate balance between fostering technological innovation and safeguarding fundamental human rights and democratic values. How can policies ensure transparency and explainability in AI systems for public trust?

- **Competencies Addressed:** Students will "champion the ethics of AI through critical advocacy" and "contribute to the co-creation of ethical standards for AI practices". They will "critically evaluate and reflect on the implications of AI for society at large". They will also practice problem scoping for AI system design from legal, ethical, and logical perspectives.
- **"Community Disinformation Resilience Project"**
 - **Focus:** Human-centred mindset (Citizenship in the AI era), Ethics of AI (Safe and responsible use), Cybersecurity (Strengthening Human Resilience).
 - **Description:** Building on community-based strategies for combating misinformation, students will design and potentially implement a local community project to **build collective resilience against AI-driven disinformation**. This could involve:
 - Developing and delivering **advanced workshops or creating interactive educational materials** (e.g., "inoculation games") for different age groups in their community (e.g., younger students, parents, senior citizens). The content should focus on identifying sophisticated deepfakes and AI-generated text, understanding how social media algorithms amplify content, and protecting personal data and privacy when interacting with AI systems.
 - The project should promote **critical thinking, discerning credible sources, and verifying information** before sharing. It should also incorporate strategies to foster trust, open communication, and self-reflection on cognitive biases.
 - **Discussion:** Explore the concept of "cognitive warfare" and how AI-driven disinformation targets human perception, trust, and beliefs. Discuss the broader societal impacts of disinformation, including polarization and the erosion of trust in institutions and the collective sense of reality. How can local communities leverage their "strong sense of community and shared purpose" to combat sophisticated disinformation tactics and become "more informed"?
 - **Competencies Addressed:** Students will be "actively participating in, and contributing to, the building of inclusive AI societies" and "promoting the design and use of AI for the enhancement of human welfare, inclusion and social justice". They will "carry out responsible AI practices in compliance with ethical principles and locally applicable regulations". This strengthens "human resilience" which is a core component of treating disinformation as a cybersecurity threat.

- **"AI's Carbon Footprint & Ethical Sustainability Audit and Mitigation"**
 - **Focus:** Ethics of AI (Ethics by design), Human-centred mindset (Citizenship in the AI era), AI Techniques and Applications (Creating AI tools).
 - **Description:** Students will conduct in-depth research into the environmental impact (e.g., energy consumption, carbon emissions) of training and deploying large AI models used in generative AI, and how this relates to climate change. They will then:
 - **Conduct a comprehensive "ethical sustainability audit"** of a chosen AI application (e.g., a popular generative AI tool, a cloud-based AI service, or a social media platform's AI). This audit should go beyond just functionality to assess its environmental footprint and its potential to contribute to or mitigate climate change.
 - **Propose, and ideally, conceptually prototype design modifications or alternative AI techniques** that could significantly reduce the environmental impact while maintaining or improving ethical use and effectiveness. This could involve exploring more energy-efficient AI models, advocating for data collection methods that minimize environmental harm, or suggesting alternative computational approaches.
 - **Discussion:** Critically analyse the tension between rapid AI innovation and environmental sustainability. How can students, as future AI co-creators and citizens, advocate for and implement "environmentally-friendly AI tools" and robust "ethics by design" principles that explicitly consider ecological impact throughout the AI lifecycle?
 - **Competencies Addressed:** Students will "champion the ethics of AI through critical advocacy" addressing environmental concerns. They will "critically evaluate and reflect on the implications of AI for society at large, particularly how it might affect the environment". This connects to the 'Create' level emphasis on "deepening and applying knowledge and skills on data and algorithms to customize existing AI toolkits to create task-based AI tools", and understanding the trade-offs in architectural configurations to optimize efficiency and minimize environmental impact.