

Impact of AI on Early Career Researchers: Challenges, Opportunities and Responsibilities

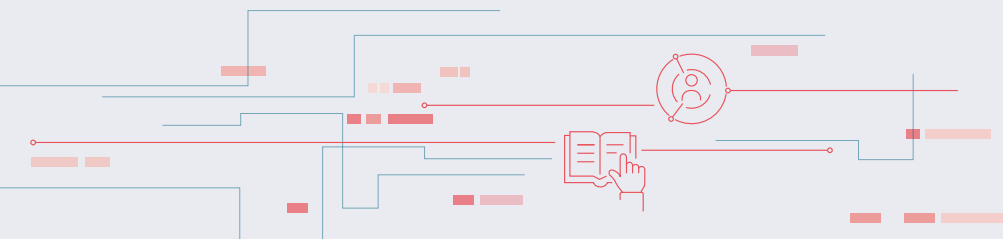


Background and Objective

Artificial intelligence (AI) has become increasingly pervasive in various facets of our lives and work. As both teachers and scholars at the forefront of scientific progress, **early career researchers (ECRs)** face both challenges and opportunities in dealing with AI in their daily work. In this booklet, we reflect on these impacts along five axes: **teaching, research, communication, policymaking and sustainability**. Furthermore, we highlight the potential responsibilities of ECRs, researchers and institutions in relation to AI.

As an organization that brings together early career researchers from a wide range of disciplines, the Swiss Young Academy (SYA) is well positioned to critically reflect on the implications of AI for science and society – and to foster interdisciplinary dialogue about its current and future role. Neither this project nor this booklet aims to prescribe the way people should be using AI; rather, the intention is to

- **identify and assess** the impact of AI on scientists, and especially early career researchers within the Swiss science ecosystem and broader society;
- **highlight areas of reflections** concerning AI usage as well as recommendations;
- **promote informed discussion** about the present and future of AI in science and society.



AI in Research: Challenges & Opportunities



OPPORTUNITIES

Increased Productivity

- Faster data analysis & processing, automated text annotation, efficient generation of synthetic data, accelerates literature review & reading

New Research Skills

- AI helps researchers learn new methods quickly update knowledge fast and work across disciplines

Support for Scientific Writing

- Summarizing & organizing material, drafting articles & proposals, proofreading & improving clarity, especially helpful for non-native English speakers

Research Discovery & Collaboration

- Specialized AI tools to identify relevant research questions, make connections across topics and improve interdisciplinary collaboration



CHALLENGES

Data Quality & Bias

- AI systems often use poor-quality or biased data → Risk of unfair, biased or inaccurate results
- “Black box” models → Lack of transparency in decision-making

Overuse of AI Methods

- Academic pressure to follow AI trends without understanding their limitations
- Risk of prioritizing state-of-the-art AI tools over scientific rigour

Loss of Critical Thinking

- Using AI for literature review or writing may reduce deep engagement with scientific content, harm the development of critical-thinking skills and skip important “thinking time” in the writing process

Writing & Research Integrity Risks

- Risk of unintentional plagiarism and the production of low-quality or poorly validated research outputs
- Challenges in maintaining originality & scientific integrity

Human-AI Feedback Loops

- AI can amplify human biases and may distort scientific discourse over time

Increased Pressure on Researchers

- AI accelerates research pace → More output expected → Early career researchers (ECRs) may struggle to keep up
- Fear of research directions becoming obsolete because of AI advances → Existential question: What is the role of human researchers in the future?

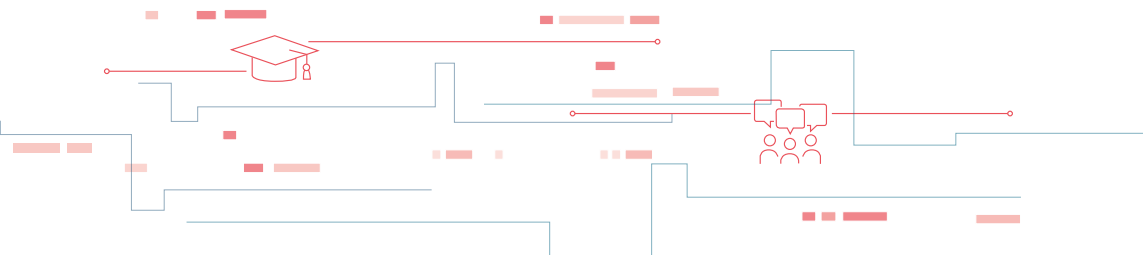


FINAL THOUGHT

For researchers: AI transforms research, creating enormous opportunities but also profound challenges. Researchers should embrace AI tools wisely, understand their limitations, maintain scientific rigour, foster critical-thinking and originality and reflect on their evolving role in a changing research landscape.

For ECRs: This considered approach is especially critical for ECRs. They have to develop their research and critical thinking skills while learning to use AI tools effectively and managing academic pressure.

For institutions: Universities and funding agencies are responsible for setting incentives that align with a considered use of AI, helping researchers manage the increasing academic pressure that AI brings, while maintaining scientific rigour. They must also provide adequate training and support on AI usage.



AI in Teaching: Challenges & Opportunities



OPPORTUNITIES

For Lecturers & ECRs

- Support with lesson planning: drafting handouts, exercises, translations + grammar & language correction
- Help with student engagement analysis: identify students at risk + monitor participation levels
- Create personalized materials for different learning needs: adapt content on the basis of language, ability and background

For Students

- 24/7 access to support through chatbots
- Low-pressure environment to ask questions (great for introverts)
- Encourages exploration and independent learning



CHALLENGES

Superficial Learning

- AI-generated answers may seem correct, but they can be biased and/or contain errors
- Students may skip deep learning & internalization
- Lack of critical thinking when using AI as a source of truth

Impact on Teaching

- Difficult to assess true student understanding and what (potentially incorrect or biased) information they get
- Polished AI output can bias grading towards form over substance
- Most AI tools were not designed for pedagogical use

Risk of Misuse in Assessment

- AI tools may be misused by students in assignments and lab work, challenging fair assessment and academic integrity
- AI assessment tools risk pigeonholing students into fixed archetypes, limiting their opportunities to grow beyond algorithmic labels

Weakening Human Interaction

- Fewer real-time teacher-student exchanges
- Risk of eroding meaningful classroom relationships
- Reduced opportunities for trust building & direct feedback
- Chatbots are polite and patient but lack emotional understanding

AI Literacy Gap

- Students often lack the skills to evaluate AI critically → Need for education on how AI works, its limits and ethical implications, privacy and data awareness

Data Privacy Risks

- Younger generations often accept data sharing uncritically: students may unknowingly share sensitive or personal data
- Risks of surveillance with personalization models tailoring content to individual students

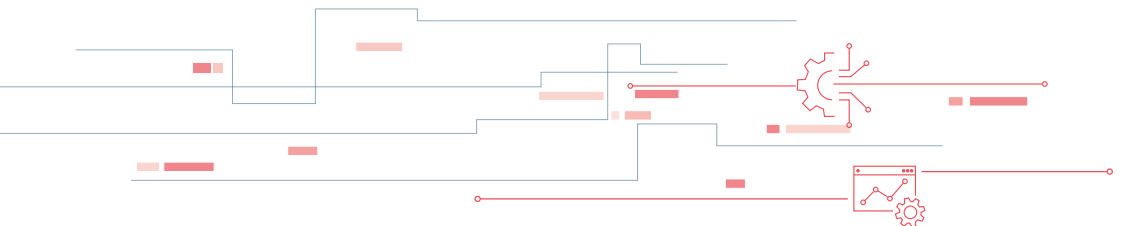


FINAL THOUGHT

For educators: AI can enhance teaching and learning – but only when guided by educators and supported by critical skills. Human connection, critical thinking and ethical awareness remain central to meaningful education.

For ECRs: As emerging mentors, ECRs should engage critically with their mentees and cultivate open discussions to ensure that AI practices are transparent, reflective and continually re-evaluated.

For institutions: Educational institutions have a responsibility to design appropriate courses to ensure that the future generation is trained in the use of AI and the impact of AI usage.



AI in Science Communication: Challenges & Opportunities



OPPORTUNITIES

Efficiency & Accessibility

- Saves time and resources for ECRs
- Democratizes science communication – supports those with less training or funding
- Generates high-quality content fast and in multiple formats (text, video, image)

Audience Adaptation

- Tailors messages to different audiences
- Makes complex science understandable and relevant
- Broadens access: multilingual, barrier-free content for global audiences

Multimodal Output

- Enables fast creation of social media posts, press releases, journalistic articles, videos and images

Distribution Optimization

- AI suggests the best timing & channels for publication
- Recommendation algorithms boost visibility and engagement

Monitoring & Feedback

- Sentiment and trend analysis to gauge public reaction
- Helps ECRs improve communication strategies



CHALLENGES

Tool Complexity

- Many tools are complex “black boxes”
- Difficult to evaluate AI-generated content for accuracy and relevance
- Requires critical thinking and digital literacy

Risk of Homogenization

- Overuse of AI might lead to
 - loss of creativity and diversity
 - generic, less engaging content

Decline in Skill Building

- Risk of neglecting the development of core science communication skills
- Danger of relying too much on automation

Accuracy & Ethics

- AI can generate plausible but factually incorrect content
- Risk of spreading biases or misinformation
- Scientific communication requires precision and trust

Algorithmic Misalignment

- Recommendation systems may favour sensational content over quality science
- Lack of transparency in content promotion

Cultural Bias

- Most training data is in English
- Non-English or underrepresented cultures may be misrepresented
- Requires active intervention from ECRs

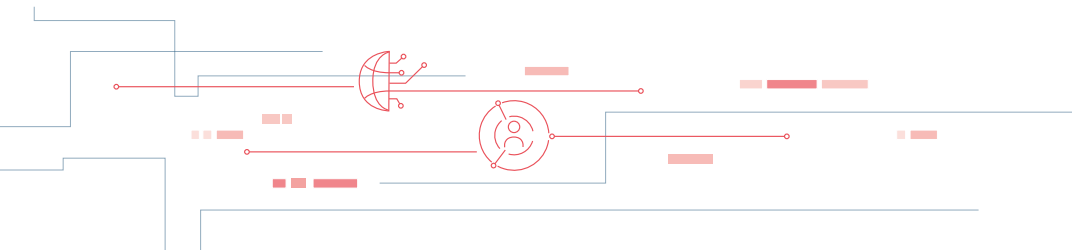


FINAL THOUGHT

For scientists: Scientists don't have to use AI for (a more effective) science communication – but if they do, they should do so critically and responsibly, as a support for their own science communication, not a replacement for it.

For ECRs: ECRs can use AI as a tool to practise and strengthen their communication skills and science communication, while ensuring that the development of their own authentic science communication skills remains central.

For institutions: Research institutions should provide training on the use of AI in science communication as part of their science communication training – complemented by ethical guidance and protective measures, especially for ECRs for whom hate or harassment in (social) media, or inappropriate or misunderstood science communication, can pose risks to their careers.



AI and Policymaking: Challenges & Opportunities



OPPORTUNITIES

Explore and Understand Regulatory Landscapes

- Easier access to legal information relevant to research
- Helps to interpret relevant, complex legislation

Participate in Policymaking Processes

- Helps to understand the different codes between policymaking and research
- Identify relevant actors
- Helps to communicate scientific knowledge to policymaker (see AI in Science Communication)



CHALLENGES

New Legal and Integrity risks

- Accidental breach of responsibility
- AI usage can easily break legal duties (e.g., sharing confidential documents)
- AI blurs the line with authorship and content ownership, opening new challenges in maintaining integrity in research

Governance & Regulation Challenges

- Divided opinions within the industry: some oppose regulation, while others welcome clear rules to guide future developments
- Potential for conflicts between innovation and regulation
- Potential mismatch between regulators' expertise and required technical knowhow to legislate on AI issues
- Pace of AI development outstrips legislative processes
- Difficulty translating legal principles into enforceable code

Barriers for ECRs

- Complex regulatory landscape
- Potential risks for ECRs to engage in public discourse on AI policy (e.g. future employability)
- Need for interdisciplinary skills (science + law + ethics)

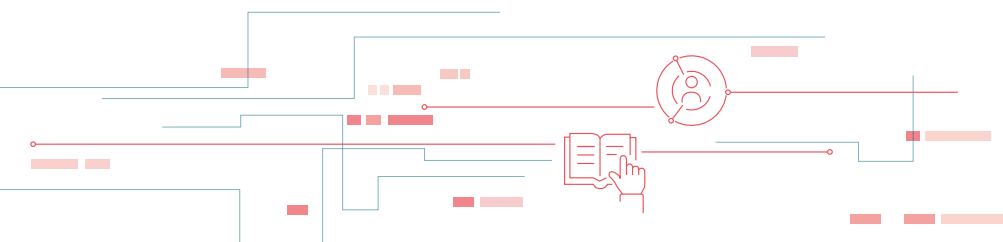


FINAL THOUGHT

For scientists: All scientists, regardless of discipline, should engage in discussions about AI's impact on research and society. Diverse, multidisciplinary input is crucial to shape regulatory frameworks that reflect the breadth of scientific perspectives.

For ECRs: As researchers at the forefront of scientific discovery, ECRs are uniquely positioned to offer critical insights into the uses and potential impacts of AI across research fields.

For institutions: While institutions already contribute to advising regulators, they should actively include younger voices, whose fresh perspectives can enrich and diversify the conversation around AI governance.



AI and Sustainability: Challenges & Opportunities



OPPORTUNITIES

AI for Environmental Solutions

- AI can support
 - resource optimization (energy, water, materials)
 - environmental monitoring (real-time data analysis)
 - climate & ecosystem management
 - evidence-based decision-making in governance & policy

Interdisciplinary Collaboration & Sustainable Innovation

- Develop AI systems that address environmental, social & economic sustainability together
- ECRs can help integrate sustainability values directly into technological development
- Opportunity to take the lead in setting new standards for sustainable AI use



CHALLENGES

Energy Consumption & CO₂ Emissions

- Training large AI models = high resource use → Generating content (text/images) with AI = energy-intensive
- Call for: mindful usage of AI – even if its usage seems trivial or harmless, it should also be used with sustainability considerations
- Call for: transparent reporting of energy use, efficient deployment strategies and limiting AI use to cases with clear environmental benefits

AI Can Reinforce Existing Inequalities

- Unequal global access to AI technologies (cost, network, training)
- Risk of benefiting only privileged regions or social groups

Systemic Risks

- Cybersecurity threats
- Reliability issues
- Dependence on resource-intensive infrastructure

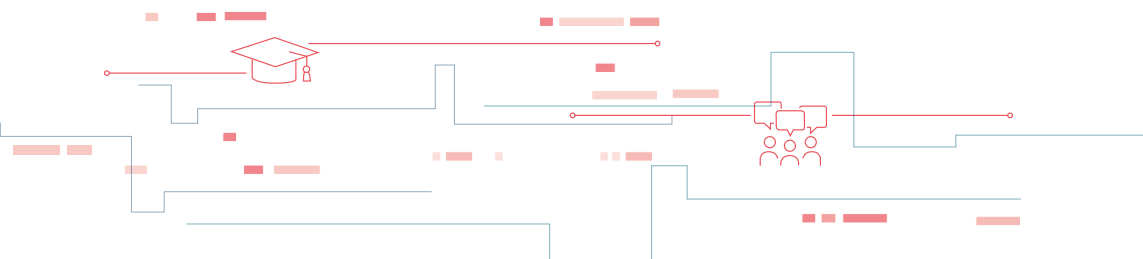


FINAL THOUGHT

For scientists: AI can be a powerful tool for sustainability – but only if used thoughtfully, ethically and responsibly. Scientists should critically reflect on the societal impact of their AI usages.

For ECRs: As younger researchers involved in the science-making process and witnessing the trend evolutions, ECRs should not shy away from taking the lead in setting new standards for sustainable AI use.

For institutions: When defining guidelines for sustainable AI usage, institutions should consider both environmental and societal impacts of AI.



Responsibilities for Early Career Researchers

AI LITERACY

- Become familiar with AI tools
- Understand the underlying technology
- Be aware of limits and risks
- Ensure the correctness and accuracy of content
- Understand rights and duties when using AI tools

TRANSPARENCY OF AI USAGE

- Disclose when and how AI is used
- Prioritize open-source and transparent models
- Ensure sufficient data protection

INVOLVEMENT IN THE PUBLIC DISCOURSE AND REGULATIONS

- Inform about the risks of AI misuse (in class or to the public)
- Help train the next generation of AI-natives
- Engage with media to promote informed and fact-based discourse
- Engage with policymakers to inform them about AI opportunities and risks (from different domain expertise)
- Strive to incorporate democratic values in AI systems

SUSTAINABILITY CONSIDERATION

- Report on the usage and environmental impact of AI tools used in research
- Promote responsible and ethical AI
- Question general assumptions about sustainability
- Promote transparency, adopt sustainable practices and foster open dialogue
- Reflect on the impact of AI usage on equality in research and the impact of research

Responsibilities for Scientific Institutions

INSTITUTIONAL POLICIES

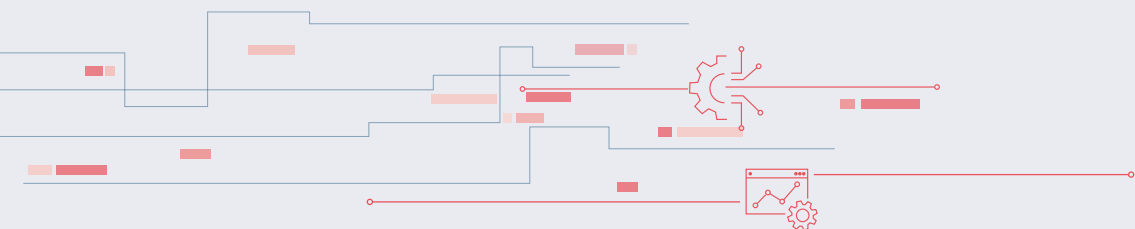
- Set appropriate guidelines and ethical standards
- Create incentives for the appropriate use of AI

SUPPORT FOR ECRS

- Provide training (AI, science communication, interaction with the public...)
- Provide the right tools to work with AI
- Provide “protection” for ECRs against online/media attacks

Outlook for Early Career Researchers

- AI provides both opportunities and challenges
- ECRs, regardless of their disciplines, should remain critically engaged in public discussions around AI – and contribute to shaping them
- AI use comes with responsibility: transparency, adequate use and sustainability



MORE INFORMATION

To the project



Swiss Young Academy



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Swiss Young Academy

The Swiss Young Academy is a network for early career academics and provides an inspiring environment for inter- and transdisciplinary exchange and innovative ideas. The Swiss Young Academy belongs to the network of the Swiss Academies of Arts and Sciences.

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