



<https://doi.org/10.5281/zenodo.15972964>



ETHICAL REGULATION OF AI & EDUCATION (AI&ED): NEEDS AND BENEFITS

Dr. Christian M. Stracke

Rheinische Friedrich-Wilhelms-Universität Bonn, Germany

23rd MEITAL Conference 2025 International Track, Tel Aviv
16th of July 2025, hybrid in Israel and online

stracke@uni-bonn.de <http://www.opening-up.education>



This presentation will be published on:

<https://opening-up.education>

**With Creative Commons Open License
for saving, sharing & re-using slides**

"Attribution – Noncommercial – Share Alike 3.0"

**You can freely share, copy, distribute and transmit the work
under the following conditions:**

1. Attribution – 2. Noncommercial – 3. Share Alike



Some rights reserved, see:

<http://creativecommons.org/licenses/by-nc-sa/3.0/>





About myself



Coordinator Cloud Strategy, OE and AI&ED, University of Bonn



Adjunct Professor, Korean National Open University



Advisory Professor, East China Normal University



Founder & Director, European Research Institute eLC



100+ research projects with 55+ Mio. € budgets



200+ scientific publications incl. 100+ peer-reviewed / SSCI

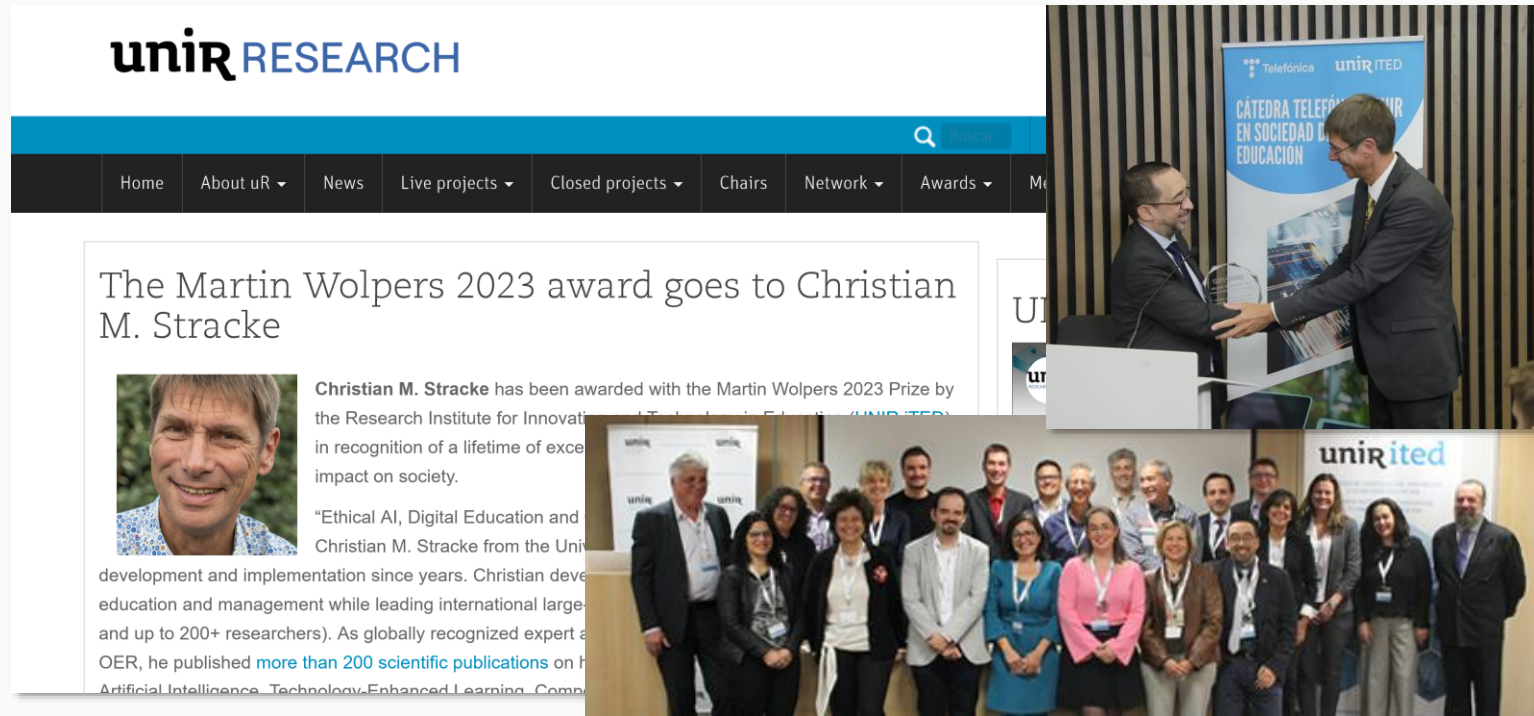


Creative design & training for 15,000 teachers & 5,000 schools



Elected Chair of ISO & CEN Standardization Committees

Martin Wolpers' Lifetime Award

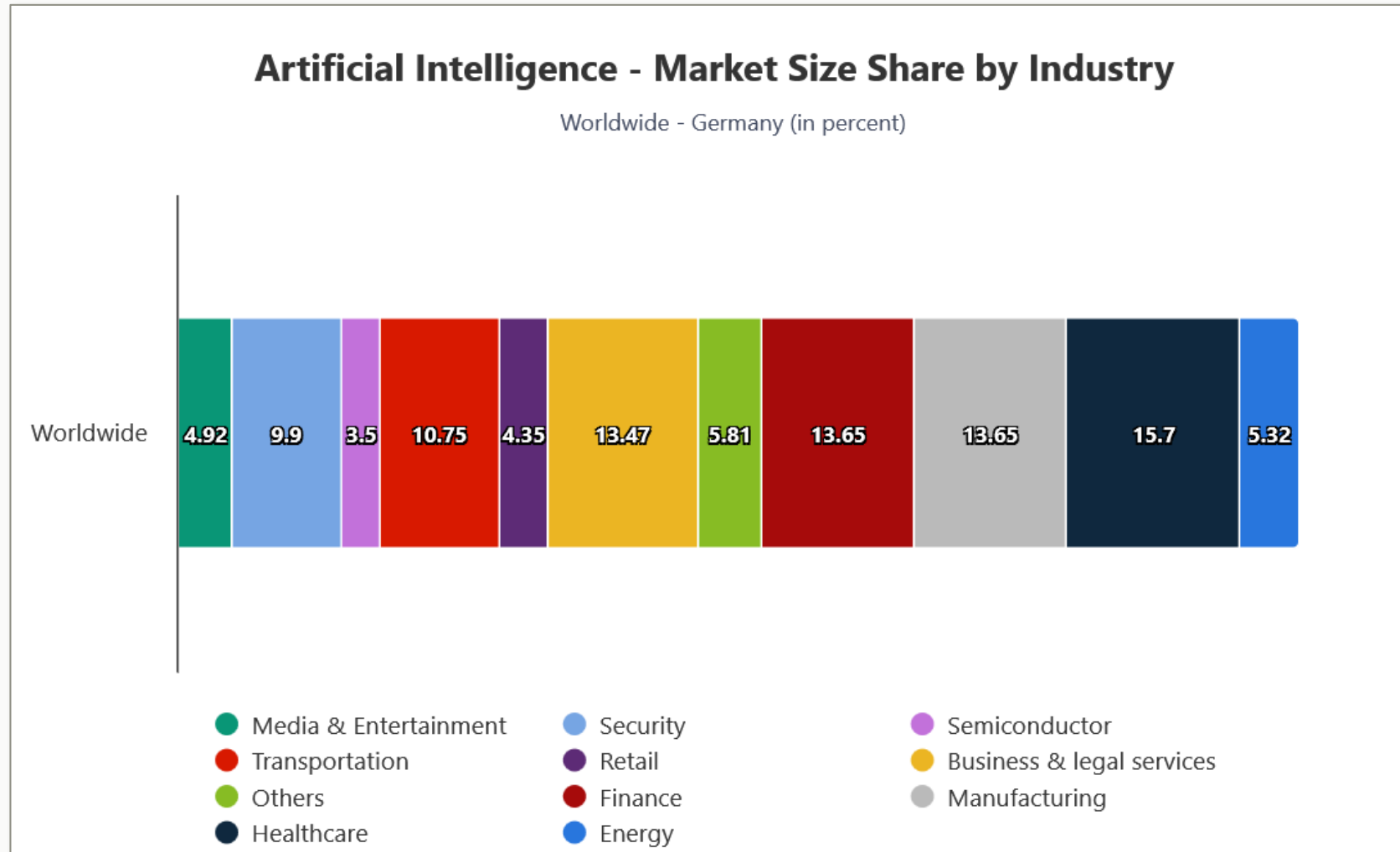


**Lifetime Award to excellence in research, education and significant impact in the society:
“your large expertise in multi-authored, successful research projects and activities, full of
multi-culturalism, with a realistic view, which gives the community useful outcomes with
great impact for an immediate application”**

<http://research.unir.net/blog/martin-wolpers-2023-award-christian-m-stracke>

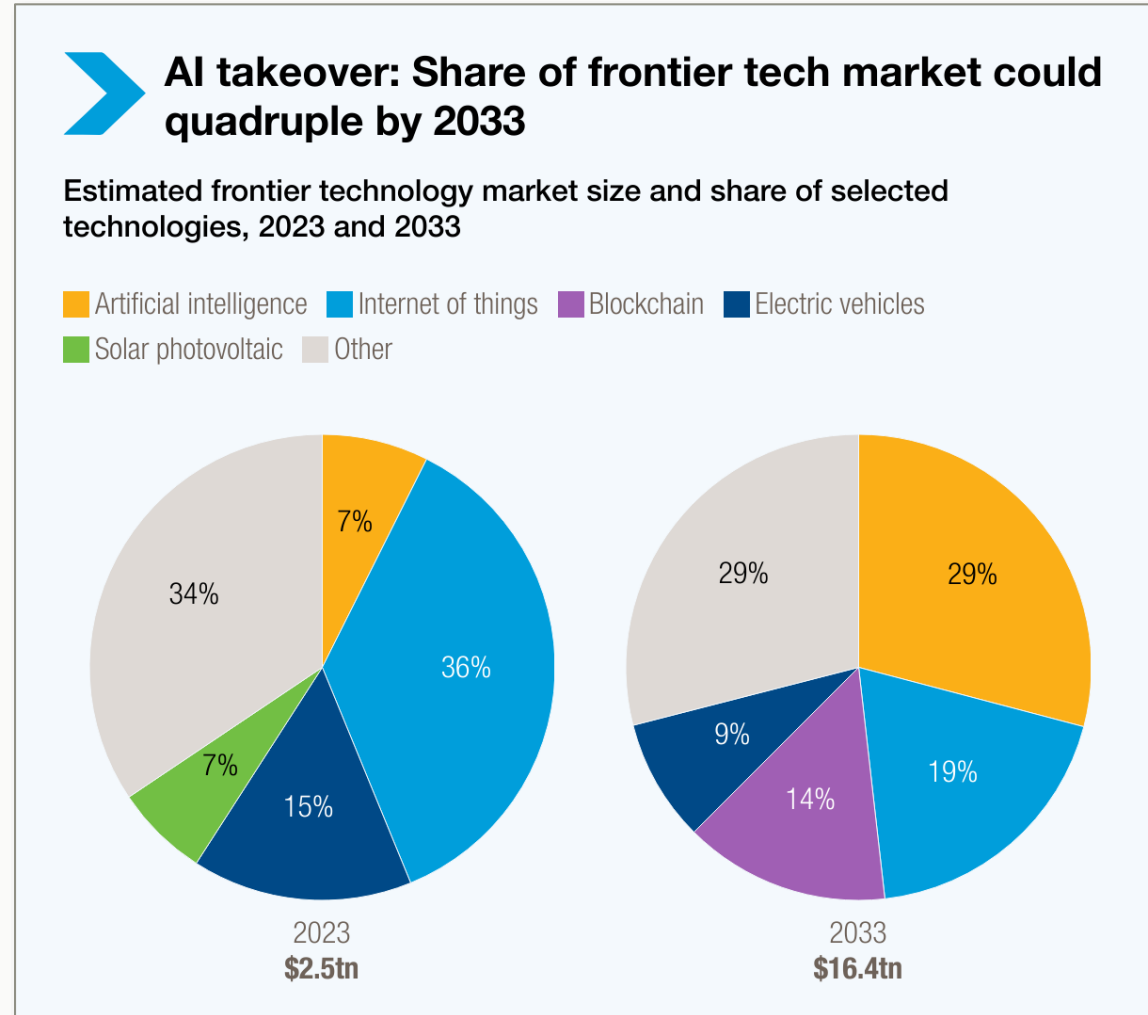
Current status of AI

AI market size in sectors



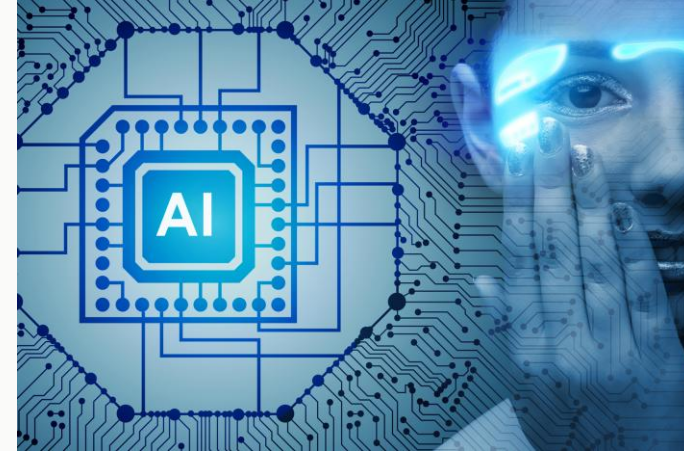
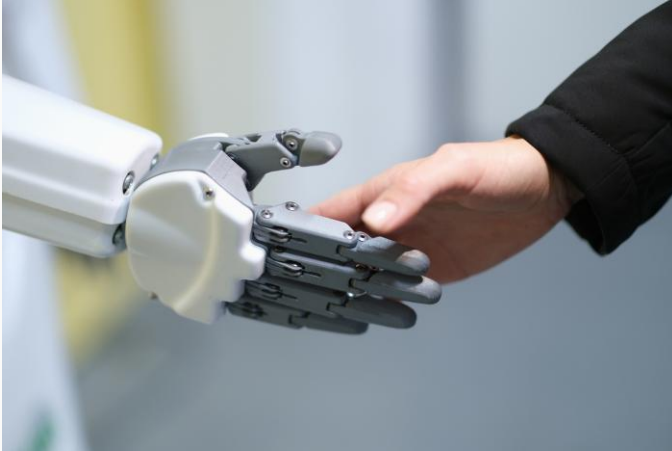
Statista (2025)

Technology prediction 2023-2033



<https://unctad.org/news/ai-market-projected-hit-48-trillion-2033-emerging-dominant-frontier-technology>

What is AI?

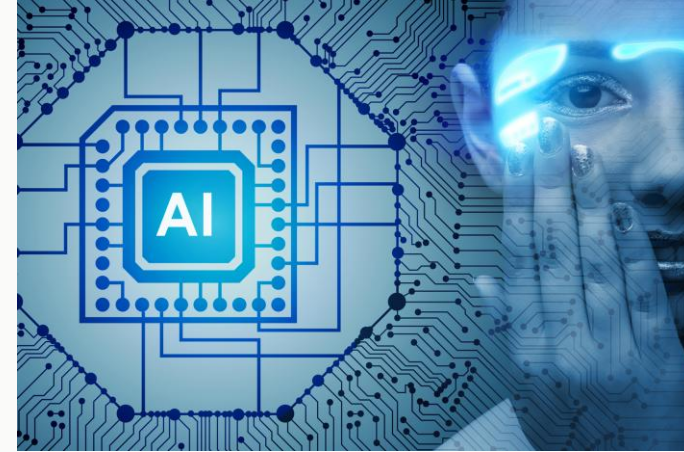
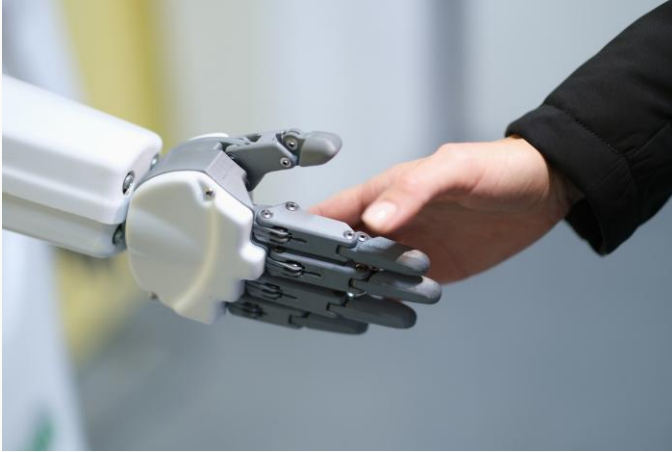


Definition of Human Intelligence

Definition of Artificial Intelligence (AI)

How do you define AI?

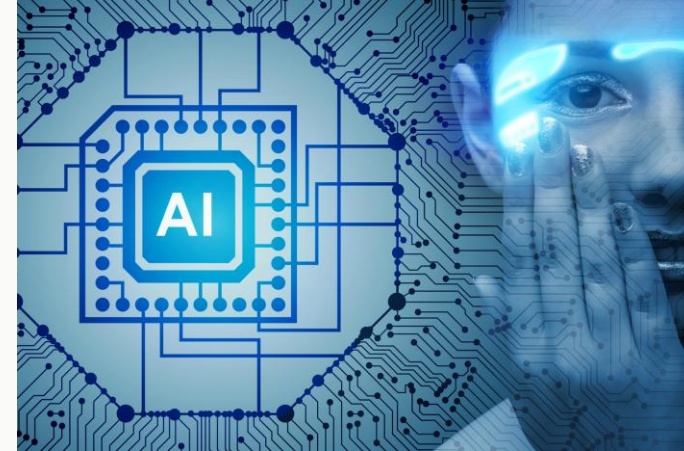
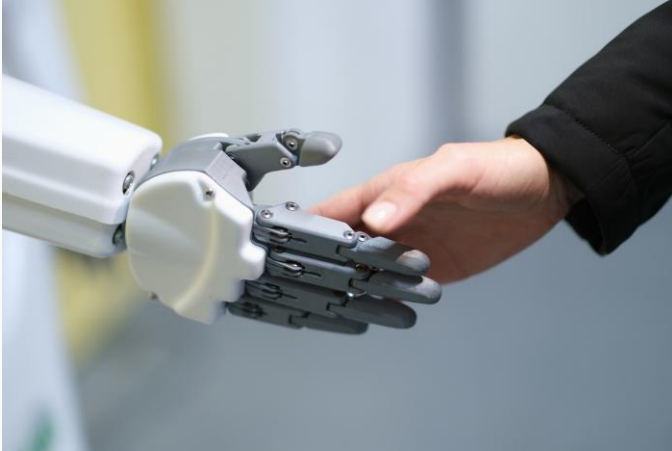
What is AI?



AI is a unique digital tool

**AI is always a human-to-human relationship
(in the responsibility)**

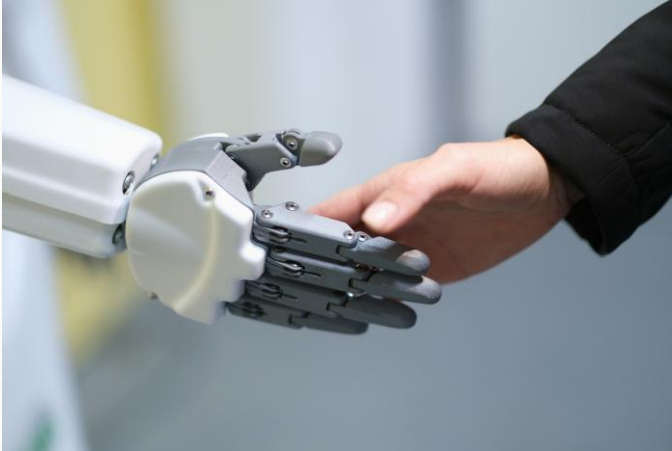
History of AI



AI concept by McCarthy and research since 1950ies
weak AI vs. strong AI vs. super-intelligence
knowledge-based AI vs. data-driven AI
hybrid systems & trainings (GenAI / GPAI)

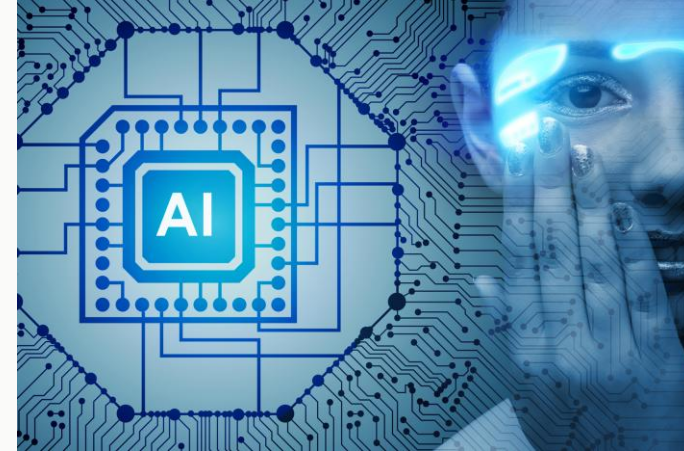
Stracke, C. M. et al. (2024). https://doi.org/10.1007/978-3-031-64315-6_21 (pre-print: <https://doi.org/10.5281/zenodo.11518072>)

Different Types of AI



Weak AI:

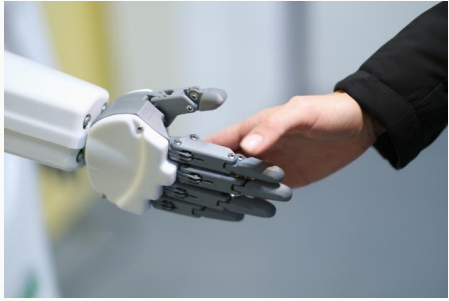
**Programming
Automatisation
Training**



Strong AI:

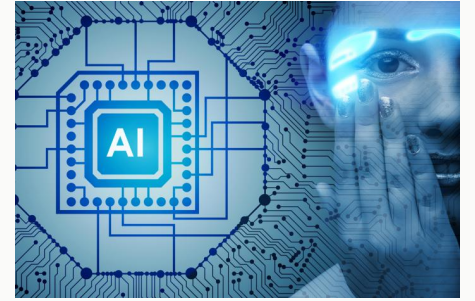
**Self-development
"Intelligence"
Self-decisions**

AI and Big Tech



AI Contradictions

**AI providers & CEOs deny
own interests & options**



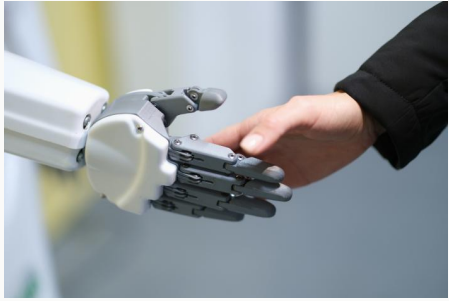
"Pause Giant AI Experiments: An Open Letter.

**We call on all AI labs to immediately pause for at least 6 months the training
of AI systems more powerful than GPT-4."**

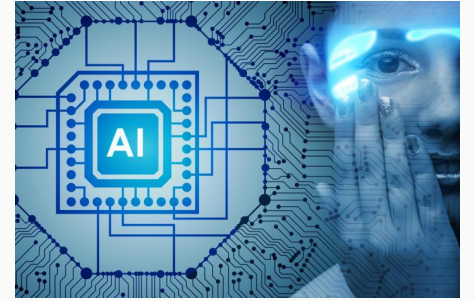
(Future of Life Institute, 22nd of March 2023)

**"Mitigating the risk of extinction from AI should be a global priority
alongside other societal-scale risks such as pandemics and nuclear war."**

(Center for AI Safety, 30th of May 2023)



AI Claims & Interests



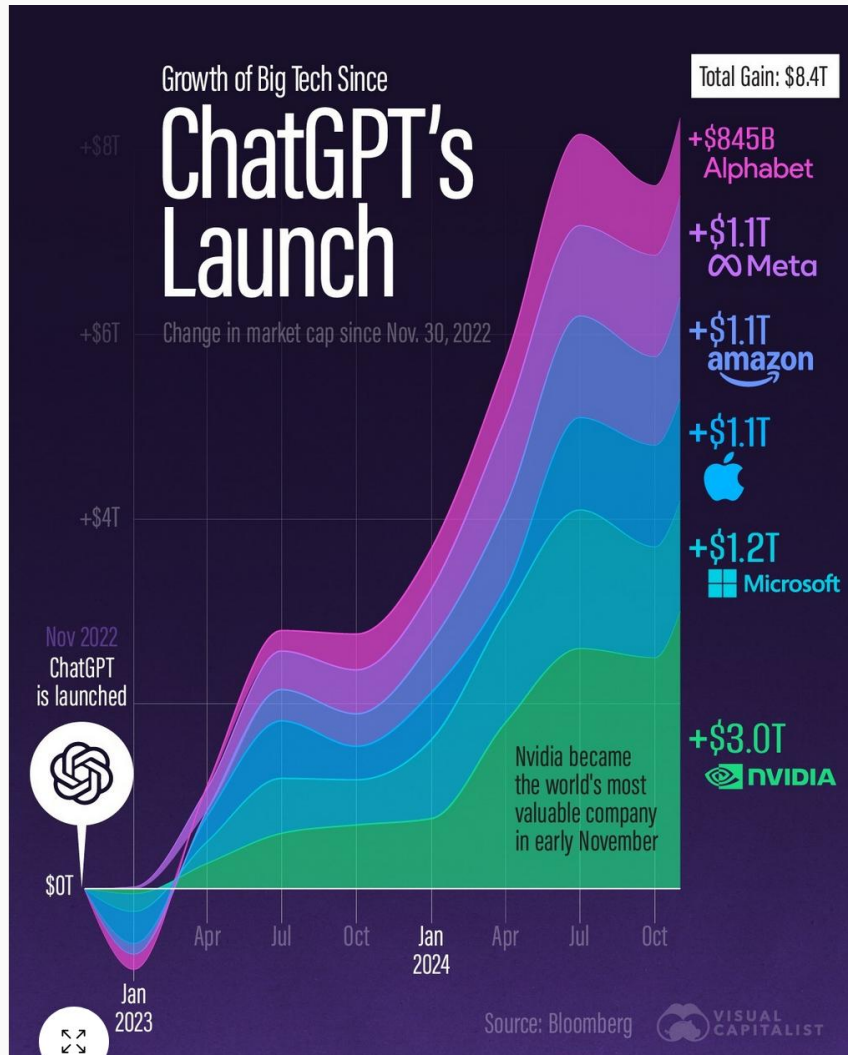
**Commercial profit &
market monopolism**

**AI = Disruptive technology like no other before in human history:
Revolution for all and everything (incl. learning, school / higher education)**

**AI has to immediately be introduced and used everywhere:
AI Competences and 21st century skills are urgently required**

All these claims are not proven and only serve own profit interests

Increasing Power of Big Tech

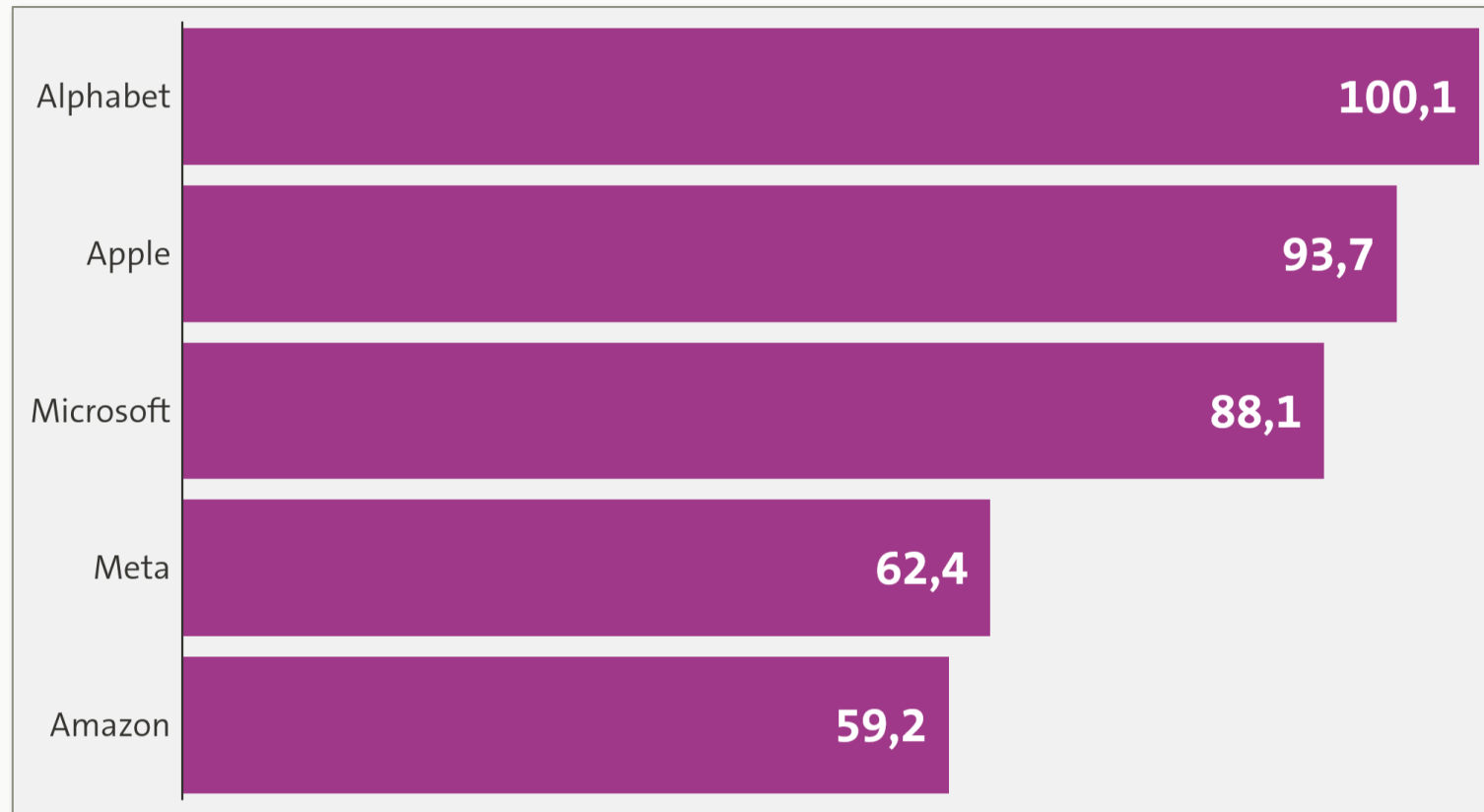


In 2024, the combined market capitalization of the five largest companies in the world—Apple, Nvidia, Microsoft, Amazon, and Google—climbed to around \$15 trillion.

The top five Big Tech firms account for roughly 25% of all U.S. equity value.

<https://www.visualcapitalist.com/charted-the-growth-of-big-tech-since-chatgpts-launch/>

Profits of Big Tech in 2024



<https://www.tagesschau.de>

Big Tech fines vs. earnings in 2024

Company	Total fines in 2024	Time to pay off its fines (using free cash flow)
Amazon	\$57,478,000	1 day, 0 hours, 51 minutes
Apple	\$2,117,203,000	7 days, 2 hours, 28 minutes
Google	\$2,974,752,000	16 days, 21 hours, 25 minutes
Meta	\$1,462,850,000	9 days, 19 hours, 15 minutes
Microsoft	\$1,605,000,000	7 days, 21 hours, 49 minutes

<https://proton.me/blog/big-tech-pays-fines-under-3-weeks>

Removed Ban on AI for Weapons



<https://www.amnesty.org/en/latest/news/2025/02/global-googles-shameful-decision-to-reverse-its-ban-on-ai-for-weapons-and-surveillance-is-a-blow-for-human-rights/>

And the (AI) Future?



"Today, an oligarchy is taking shape in America of extreme wealth, power, and influence that literally threatens our entire democracy, our basic rights and freedoms, and a fair shot for everyone to get ahead."

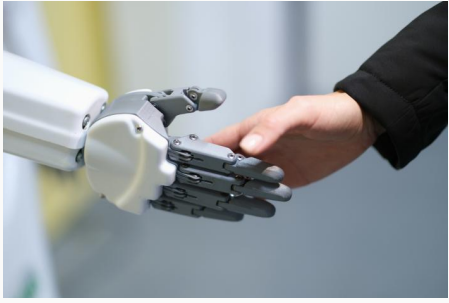
Joe Biden on 15th of January 2025

<https://tagesschau.de> - <https://bidenwhitehouse.archives.gov/briefing-room/speeches-remarks/2025/01/15/remarks-by-president-biden-in-a-farewell-address-to-the-nation/>

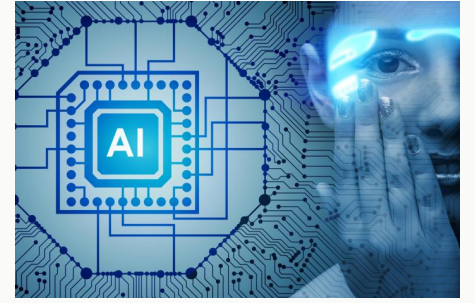
Hypothesis 1

**Artificial Intelligence changes more than
COVID-19 and any other digital tool**

Ethics of AI



Ethics dimensions

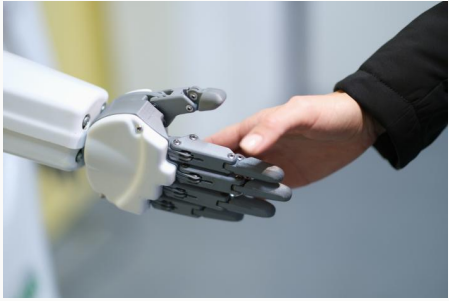


Meta-ethics: Epistemology

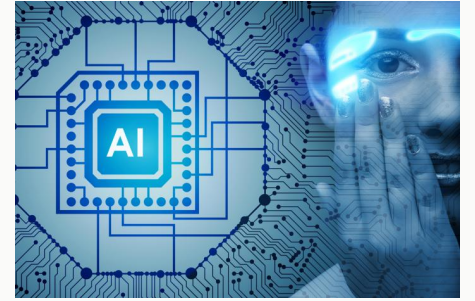
Normative ethics: Which laws?

Applied ethics: Which recommendations?

Stracke, C. M. (2024). https://doi.org/10.1007/978-981-97-8638-1_7



Ethical AI Questions

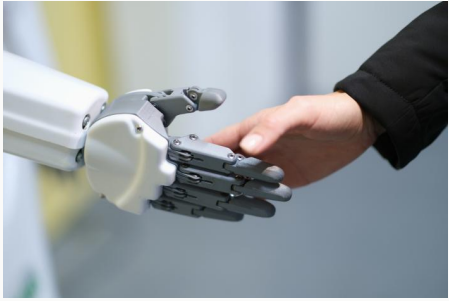


Ethics: What should we do?

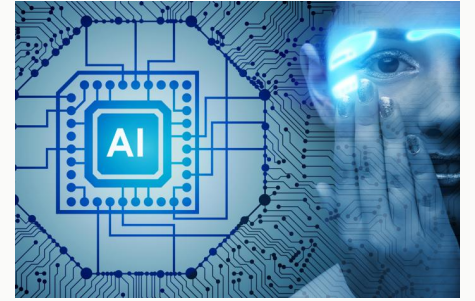
Ethical AI: How should we use AI?

What is Artificial Intelligence?

Stracke, C. M. (2024). https://doi.org/10.1007/978-981-97-8638-1_7



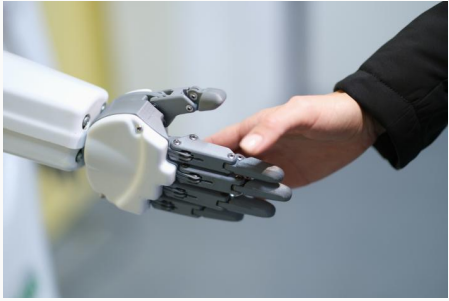
Ethical AI



Five central ethical principles (from 84 frameworks):

- 1. Transparency**
- 2. Justice and fairness**
- 3. Non-maleficence (do not harm)**
- 4. Responsibility**
- 5. Privacy**

Jobin et al. (2019). <https://doi.org/10.1038/s42256-019-0088-2>



Time pressure

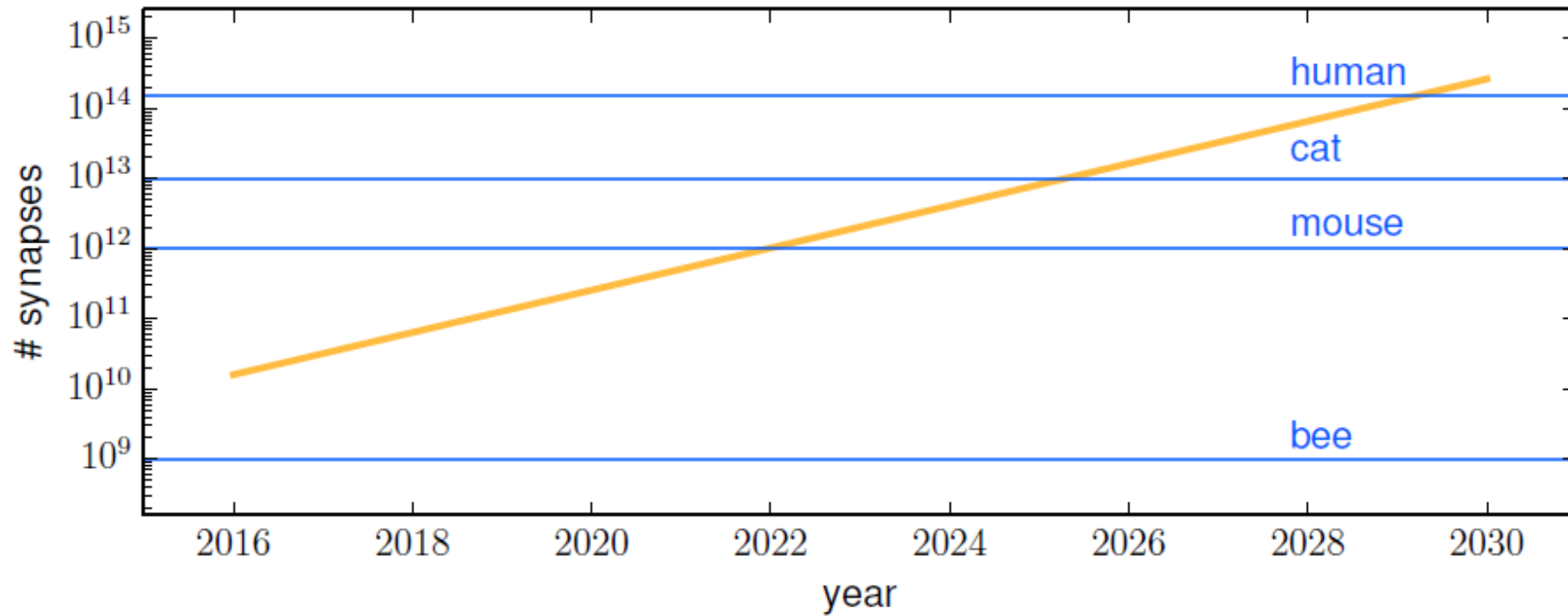
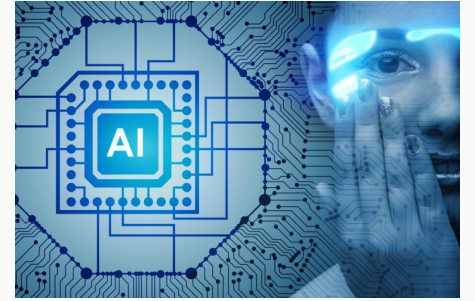
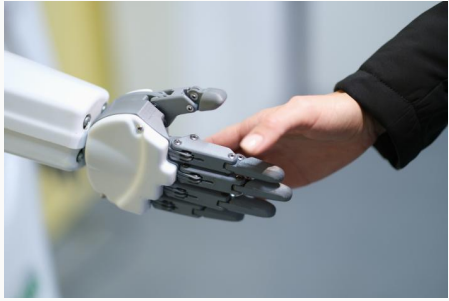
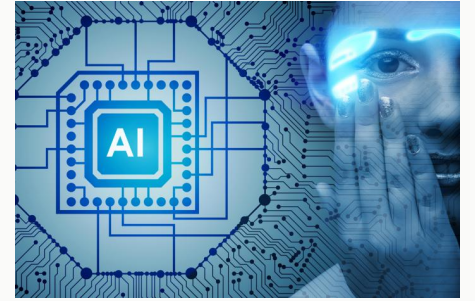


Figure: Christian Bauckhage (University of Bonn)

Legal regulation of AI



AI Regulations



**European Commission:
Ethical Guidelines (2022) & AI Act (2024)**

**European Parliament:
Hearing of Committee for Education (2022)**

**Council of Europe:
Framework Convention on AI - "Treaty" (2024)**



AI Act

EU AI Act (into force: 1st August 2024)

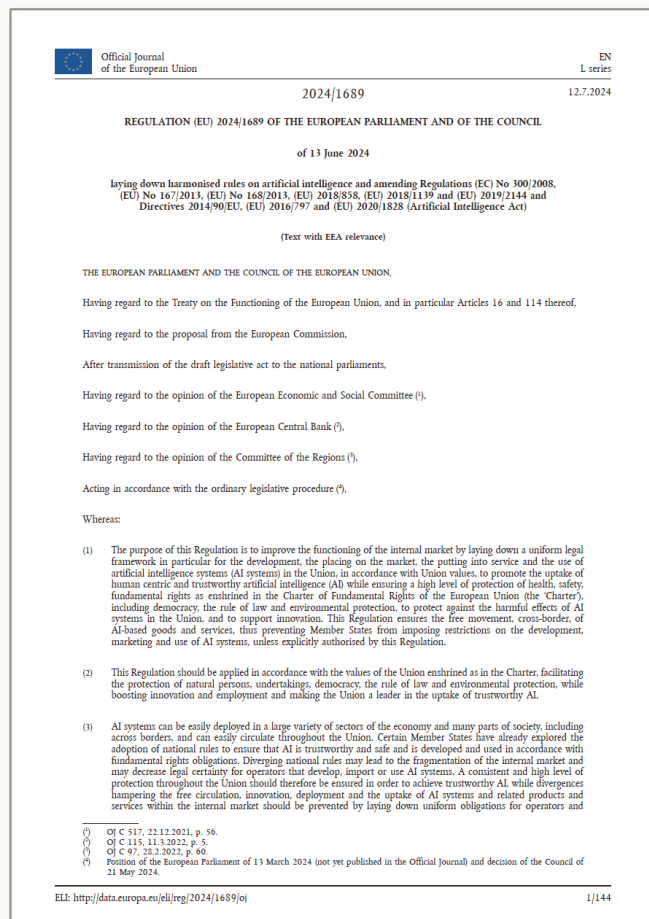
Unacceptable risk - prohibited

High-risk - regulated

Limited risk - transparency and awareness obligations

Minimal risk - unregulated

General-purpose AI - added later



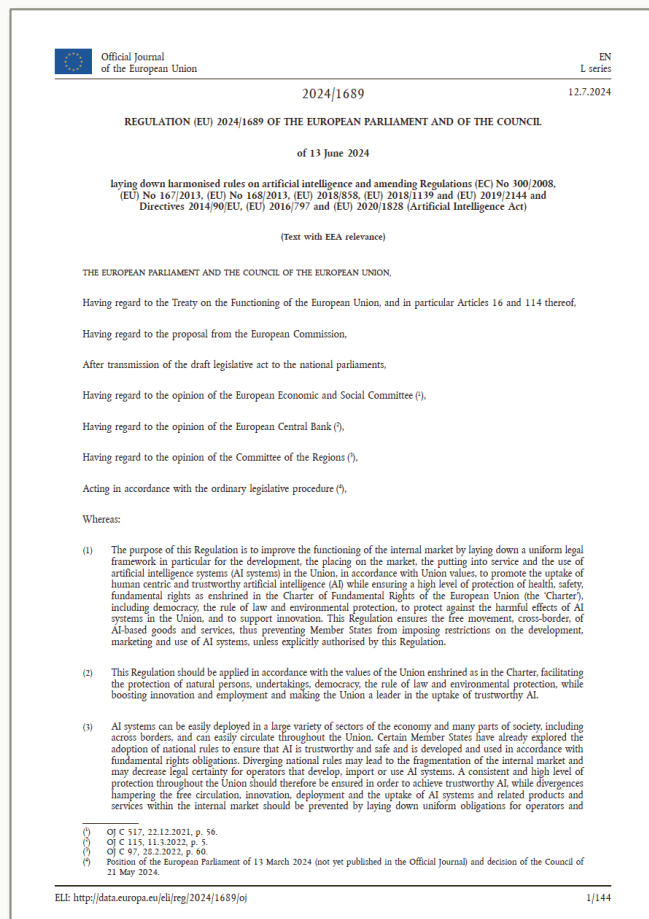
<http://data.europa.eu/eli/reg/2024/1689/oj>



AI Act

Education in AI Act:

- Recitals 4, 48, 44, 56 & 96
- Articles 4 (AI literacy), 5 (Prohibited) & 9 (High-risk)
- Annex III (High-risk)



<http://data.europa.eu/eli/reg/2024/1689/oj>



Framework Convention

CoE Treaty no. 225 (5th September 2024)

- Human dignity & individual autonomy
- Transparency and oversight
- Accountability and responsibility
- Equality and non-discrimination
- Privacy and personal data protection
- Reliability
- Safe innovation



Council of Europe Treaty Series - No. 225

Council of Europe Framework Convention on Artificial Intelligence and Human Rights, Democracy and the Rule of Law

Vilnius, 5.IX.2024

Preamble

The member States of the Council of Europe and the other signatories hereto,

Considering that the aim of the Council of Europe is to achieve greater unity between its members, based in particular on the respect for human rights, democracy and the rule of law;

Recognising the value of fostering co-operation between the Parties to this Convention and of extending such co-operation to other States that share the same values;

Conscious of the accelerating developments in science and technology and the profound changes brought about through activities within the lifecycle of artificial intelligence systems, which have the potential to promote human prosperity as well as individual and societal well-being, sustainable development, gender equality and the empowerment of all women and girls, as well as other important goals and interests, by enhancing progress and innovation;

Recognising that activities within the lifecycle of artificial intelligence systems may offer unprecedented opportunities to protect and promote human rights, democracy and the rule of law;

Concerned that certain activities within the lifecycle of artificial intelligence systems may undermine human dignity and individual autonomy, human rights, democracy and the rule of law;

Concerned about the risks of discrimination in digital contexts, particularly those involving artificial intelligence systems, and their potential effect of creating or aggravating inequalities, including those experienced by women and individuals in vulnerable situations, regarding the enjoyment of their human rights and their full, equal and effective participation in economic, social, cultural and political affairs;

Concerned by the misuse of artificial intelligence systems and opposing the use of such systems for repressive purposes in violation of international human rights law, including through arbitrary or unlawful surveillance and censorship practices that erode privacy and individual autonomy;

Conscious of the fact that human rights, democracy and the rule of law are inherently interwoven;

<https://rm.coe.int/1680afae3c>

Hypothesis 2

**Artificial Intelligence
has to be regulated worldwide**

- in particular in education!

The Special Case of Education

Digitalisation



*Städtischer Handelshafen,
Breslau vor 1910
(Unbekannter Fotograf, SLUB/
Deutsche Fotothek)*



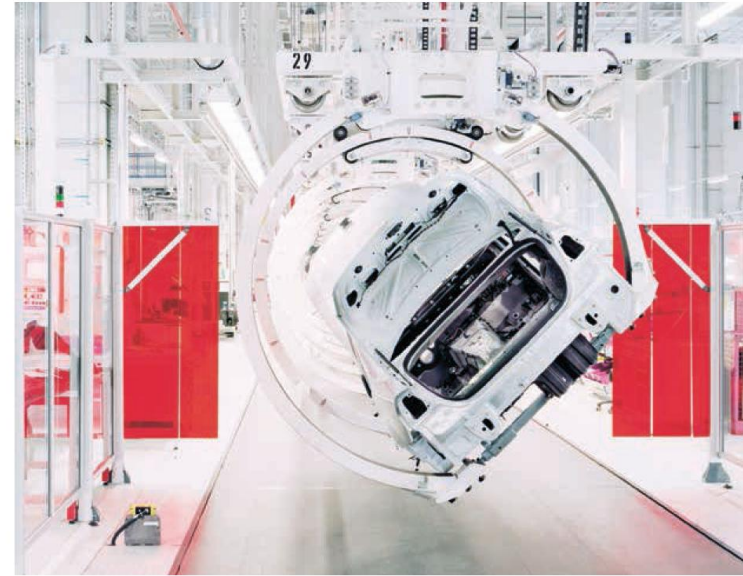
*Containerterminals, Hamburg
(Henrik Spohler)*

Photo: <https://www.bmas.de/DE/Service/Publikationen/a877-01-werkheft.html>

Digitalisation



*Industrie-Transport
Sachsenring, 1964
(Peter, Richard jun., SLUB/
Deutsche Fotothek)*



*Assembly line
(Henrik Spohler)*

Photo: <https://www.bmas.de/DE/Service/Publikationen/a877-01-werkheft.html>

Digitalisation



*Salaternte der Arbeiterinnen
und Arbeiter der Landwirt-
schaftlichen Produktions-
genossenschaft Marzahn,
Berlin 1984*

(Winkler, ddrbildarchiv.de)



*Anbau junger Salatpflanzen
in Süddeutschland*

(Henrik Spohler)

Photo: <https://www.bmas.de/DE/Service/Publikationen/a877-01-werkheft.html>

Digitalisation



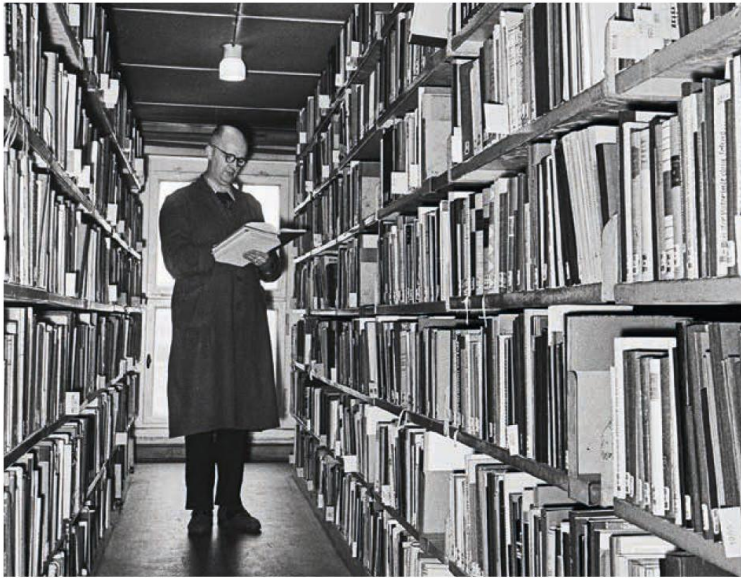
*Paketumschlag zu Weihnachten
1950er-Jahre, Herne
(Erich Höhne & Erich Pohl,
SLUB/Deutsche Fotothek)*



*Paketlogistik, Verteilzentrum
am Flughafen Köln/Bonn
(Henrik Spohler)*

Photo: <https://www.bmas.de/DE/Service/Publikationen/a877-01-werkheft.html>

Digitalisation



*Bibliothekar vor Bücherregalen
im Magazinbereich der Deutschen
Bücherei, Leipzig 1955
(Renate und Roger Rössling,*



*0/1 Dataflow #1
(Henrik Spohler)*

Photo: <https://www.bmas.de/DE/Service/Publikationen/a877-01-werkheft.html>

Digitalisation in education?



Photos: <https://www.pixabay.com> (345950) - <https://www.pexels.com> (207691)

The Special Case of Education



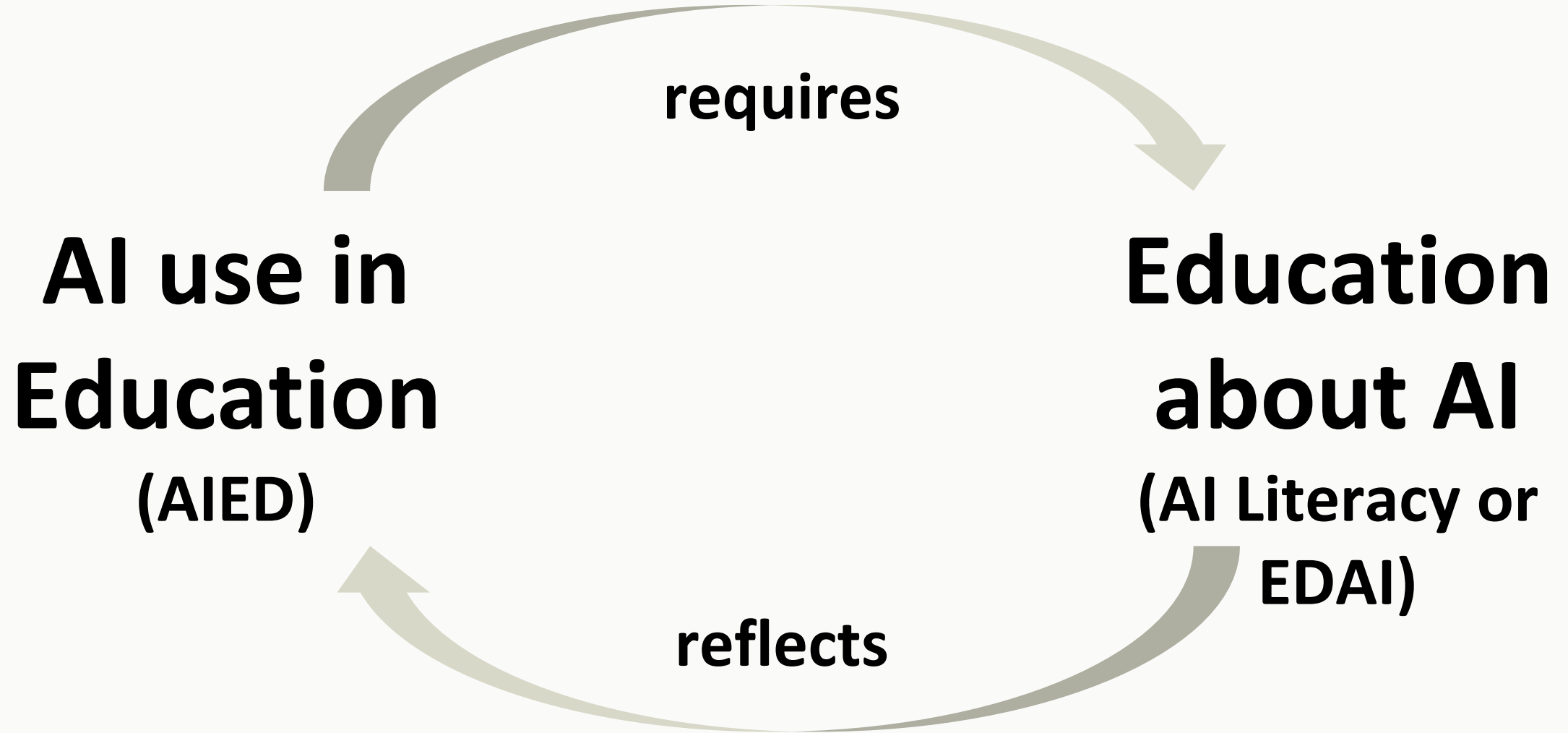
Education as human right
SDG 4: "Quality Education for All"
Equity, inclusion & mandatory school visit
Learning cannot be forced

<https://opening-up.education/publications>

Photos: <https://www.pixabay.com> (345950) - <https://www.pexels.com> (207691)

AI and Education (AI&ED)

$$\text{AI\&ED} = \text{AIED} + \text{AI Literacy}$$





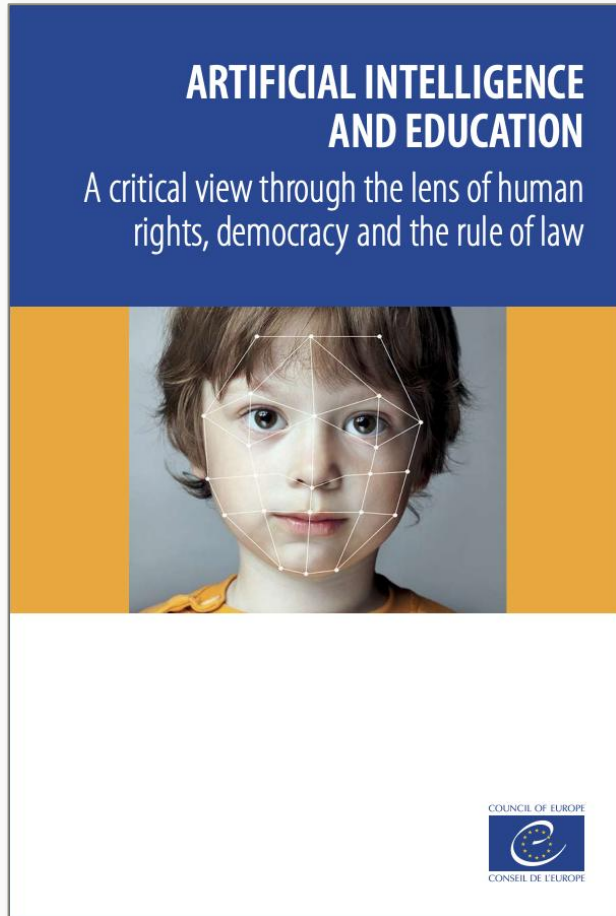
AI&ED Expert Group by CoE



<https://opening-up.education/artificial-intelligence-and-education>



AI&ED Expert Group by CoE



Artificial Intelligence and Education.

A critical view through the lens of

- **human rights,**
- **democracy and**
- **the rule of law**

<https://tinyurl.com/CoE-AI-ED-1>



Council of Europe (CoE)

Mandate by Ministries of Education: (26th session of their Standing Conference on 29th of September 2023)



Council of Europe Standing Conference of Ministers of Education

REGULATING ARTIFICIAL INTELLIGENCE IN EDUCATION

1. Why regulate Artificial Intelligence in Education?

Artificial Intelligence (AI) is a rapidly evolving and complex technology that is increasingly impacting various aspects of daily life, including education. While AI might present opportunities for enhancing teaching and learning, it also poses potential risks and challenges related to its implications on human behavior, child development, and the overall socio-economic conditions of those involved. Thus, regulating AI in educational contexts is crucial.

It has been argued that, when deployed in educational settings, AI-enabled technologies have the potential to support diverse learners, including children and lifelong learners, as well as those who have special needs. Data analytics might also offer insights into the learning process, while voice assistants and adaptive tutoring might have the potential to foster more inclusive education.

However, it is essential to acknowledge also the potential negative impacts of AI-enabled technologies on education. Poor pedagogic practices might be automated, and existing biases and discriminatory approaches could be perpetuated and disseminated, along with disinformation and misinformation. This could result in disempowering both teachers and students and could undermine human rights, in particular the right to quality education. Moreover, there is a risk of devaluing certain important aspects of education, in particular the role and the tasks of teachers as educators, incrementing the mistrust in their capacity to teach in a digital and AI learning environment. Additionally, an overemphasis on easily measurable skills rather than promoting humanistic values such as collaboration, critical thinking, ethics, and democratic ideals that are harder to assess also poses a threat to quality education. The scarcity of independent evidence for the efficacy, impact, or safety of AI-enabled technologies in educational settings necessitates proper investigation through common standards and an international review system of such technologies.

Over the past decade, significant strides have been made in digital transformation within European education systems. The Digital Citizenship Education (DCE) program, based on the 20 Competences for Democratic Culture, has provided valuable policy guidance and practical tools to member States. The Recommendation CM/Rec(2019)10 on developing and promoting

- 1. International convention as binding law for AI in Education**
- 2. Recommendation for AI Literacy**

<https://opening-up.education/artificial-intelligence-and-education>

Draft Resolution 3
on harnessing the potential of digital transformation in and through education

We, Ministers responsible for Education, meeting in Strasbourg, France, for the 26th Session of the Council of Europe Standing Conference on 28-29 September 2023:

8. **WELCOME** the development of (i) a legally-binding instrument* on the use of Artificial Intelligence systems in education to protect and promote human rights, democracy and the rule of law;
9. **Also WELCOME** the development of (ii) a recommendation to ensure that teaching and learning about AI incorporates the impact of AI on human rights, democracy and the rule of law and prioritises the active participation and agency of teachers and learners;

Protection of Individuals with regard to Automatic Processing of Personal Data (ETS No. 108), other relevant international and European conventions;

- c. the Recommendation CM/Rec(2019)10 of the Committee of Ministers to member States on developing and promoting digital citizenship education, Recommendation

TUT-03 "Ethical AI and Education"

Artificial Intelligence & Education: International Regulation for the Human Rights

<https://doi.org/10.5281/zenodo.12659055>

Workshop at AIED 2024 in Recife, Brazil

<http://aied2024.learning-innovations.eu>



Meet the Organizers



Christian M. Stracke
University of Bonn,
Germany



Irene-Angelica Chounta
University of Duisburg-
Essen, Germany



Vania Dimitrova
University of Leeds, UK



Beth Havinga
European EdTech
Alliance, Germany



Wayne Holmes
University College
London, UK

Ethical AI and Education: The need for international regulation to foster human rights, democracy and equity

Meet the Organizers



Christian M. Stracke
University of Bonn,
Germany



Beth Havinga
European EdTech
Alliance, Germany



Ron Salaj
University of Turin,
Italy



Wayne Holmes
University College
London, UK



Introductory speech by

Ahmet Murat KILIÇ

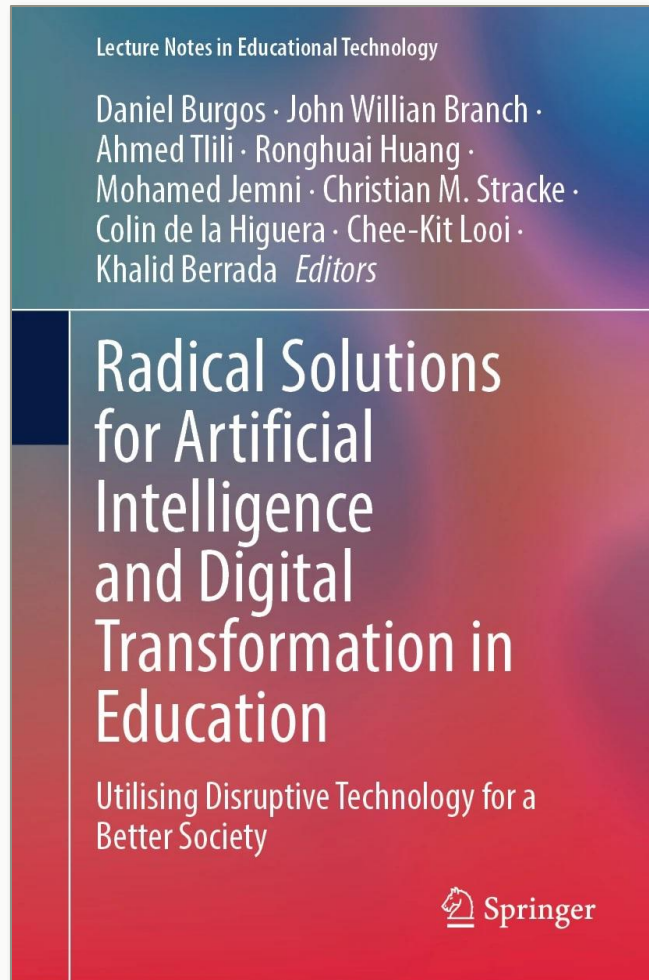
Head of the Digital Transformation Unit, Education
Department, Council of Europe

Workshop at AIED 2025 in Palermo, Italy
<https://aied2025.learning-innovations.eu>



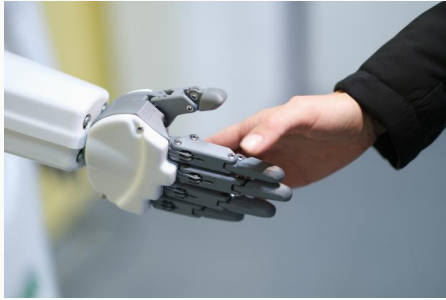
Ethical AI&ED

Ethical AI&ED & Human Rights

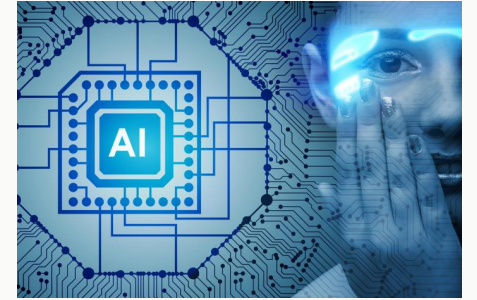


**AI&ED for strengthening the society:
"Artificial Intelligence and Education:
Ethical Questions and Guidelines for
Their Relations Based on Human
Rights, Democracy and the Rule of
Law" (Dezember 2024)**

https://doi.org/10.1007/978-981-97-8638-1_7

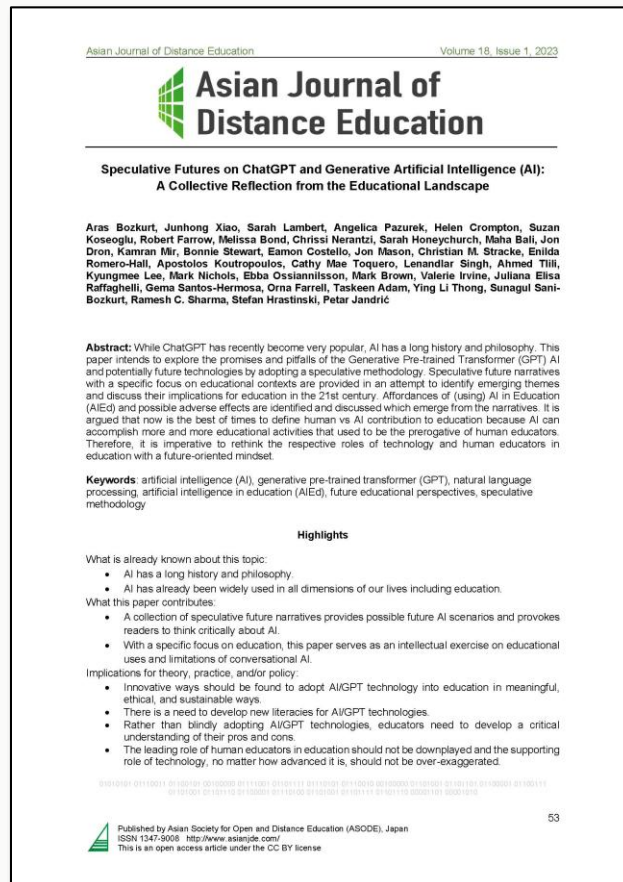


Futures of AI&ED?



**First study on speculative AI&ED futures
by huge global research team (2023):
"Speculative Futures on ChatGPT and
Generative Artificial Intelligence (AI)"
30+ positive & 30+ negative AI scenarios**

<https://www.asianjde.com/ojs/index.php/AsianJDE/article/view/709/394>



Global Trends in Ethical AI&ED

Systematic Literature Review (SLR): "Global trends in scientific debates on trustworthy and ethical Artificial Intelligence and Education" by Stracke, C.M.; Chounta, I.-A. & Holmes, W. (2024) – presented at AIED 2024 in Recife

<https://doi.org/10.5281/zenodo.11518072>

Global trends in scientific debates on trustworthy and ethical Artificial Intelligence and Education

Christian M. Stracke¹ [ORCID: 0000-0001-9636-4298], Irene-Angelica Chounta² [ORCID: 0000-0001-9159-0660], and Wayne Holmes³ [ORCID: 0000-0001-8110-1596]

¹University of Bonn, Germany; ²University of Duisburg-Essen, Germany; ³University College London, UK
stracke@uni-bonn.de, irene-angelica.chounta@uni-due.de, wayne.holmes@ucl.ac.uk

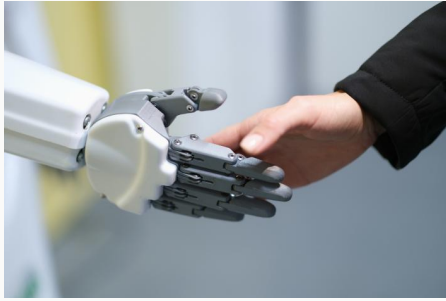
Abstract. This paper presents a systematic review of the scientific literature on trustworthy and ethical Artificial Intelligence (AI) and Education (AI&ED), including both AI *applied* in education to support teaching and learning (AI&ED), as well as education *about* AI (AI literacy). Key interest is the identification of global trends with a special focus on unbalanced disparities. Strictly following the standardised protocol and the underlying PRISMA approach, 324 records were identified and selected according to the pre-defined protocol for the systematic review. Finally, 62 articles were included in the quantitative and qualitative analysis in response to four research questions. Which (i) journals, (ii) disciplines, and (iii) regions are leading scientific debates and sustainable developments in education and trustworthy/ethical AI, and (iv) what are the past trends? The articles revealed an unbalanced distribution across the various dimensions, together with an exponential growth over recent years. Building upon our analysis, we argue for an increase in interdisciplinary research that shifts the focus from the currently dominant technological focus towards a more human-centered (educational and societal) focus. Only through such a development AI can contribute effectively to the UN Sustainable Development Goal no. 4 of a world with equitable and universal access to quality education. The results of our systematic review provide the basis to address and facilitate equality in the future AI&ED progress across regions worldwide.

Keywords: Trustworthy and ethical AI, AI&ED, Web of Science articles, Systematic literature review, Informatics and information technologies, Education and Learning sciences, Sustainable digital transformations.

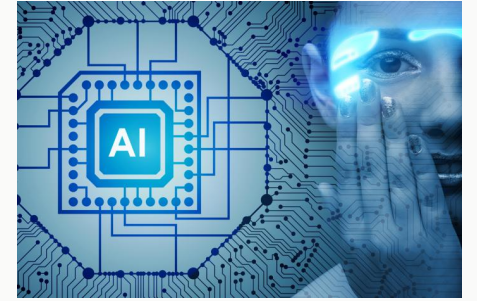
1 Introduction

The concept of Artificial Intelligence (AI) has been controversial since the term was first coined [4, 14, 18]. Nonetheless, AI has been introduced in many disciplines, including – for around fifty years – in education [2, 13, 15, 20, 23]. However, it remains the case that AI in education was mostly researched by computer scientists rather than educators in the beginning [33].

Pre-print of the camera-ready version, recommended citation:
Stracke, C. M., Chounta, I.-A., & Holmes, W. (2024). Global trends in scientific debates on trustworthy and ethical Artificial Intelligence and Education. In *Artificial Intelligence in Education, AIED 2024. Communications in Computer and Information Science*. Springer. (accepted, pre-print) <https://doi.org/10.5281/zenodo.11518072>
[Final official publication: https://doi.org/10.1007/978-3-031-64431-6_41]

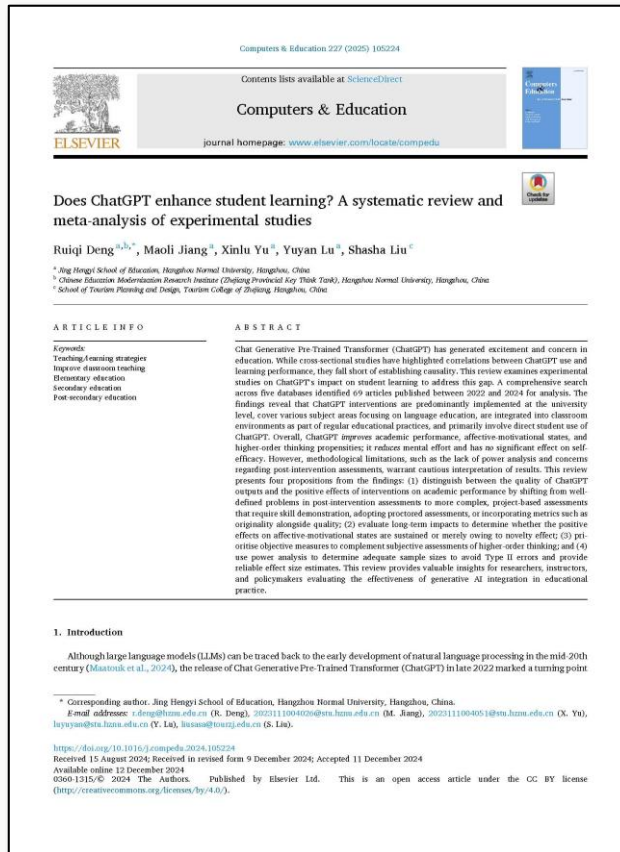


AI&ED Evidences?

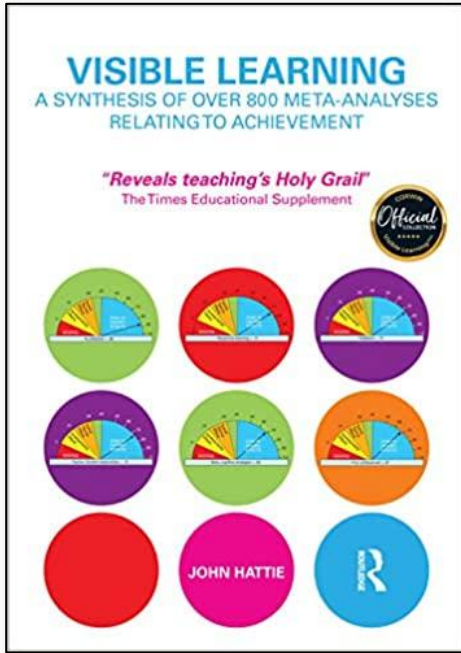


Meta study on AI&ED evidences (2025): "Does ChatGPT enhance student learning? A systematic review and meta-analysis of experimental studies"

<https://doi.org/10.1016/j.compedu.2024.105224>



Measurement in (AI and) Education?



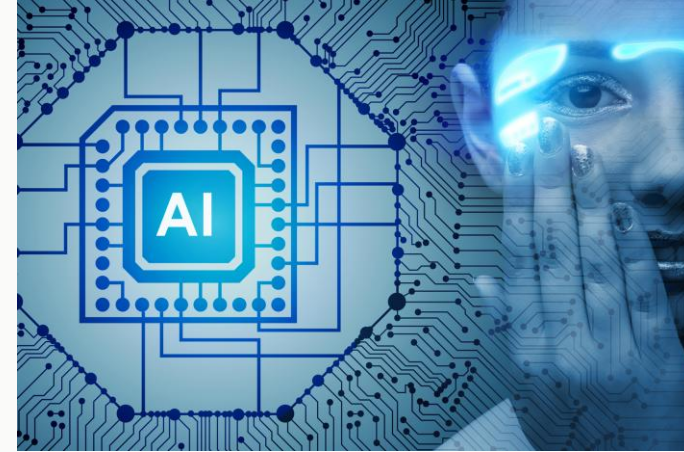
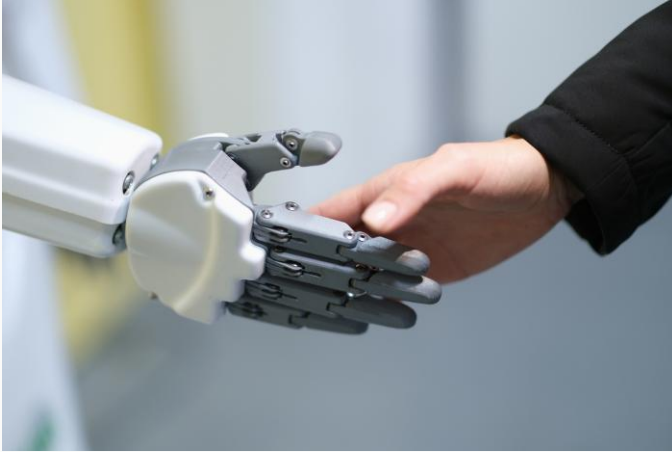
Evidences?

<https://visible-learning.org>

Meta-analyses of evidence-based studies by Hattie and others

Despite some fundamental critics by Eacott (2017), McKnight & Whitburn (2018), Terhart (2011), and Wetter, Vogel, & Hetmanek (2017)

Three Ethical Imperatives for AI&ED



Technology-independent (for objectives)
Impact-oriented (for all levels)
Society-focused (for commons)

Stracke, C. M. et al. (2024). Global trends in scientific debates on trustworthy and ethical Artificial Intelligence and education.
https://doi.org/10.1007/978-3-031-64315-6_21 (pre-print: <https://doi.org/10.5281/zenodo.11518072>)

The Big Picture: Our Society

International crises



Economic crisis (Hayes, profit only)
Education crisis (innovations, quality)
Media crisis (literacy, fake news)
Societal crisis (ethics, egoism)

Crisis? What Crisis?

https://en.wikipedia.org/wiki/File:Supertramp_-_Crisis.jpg

We need innovative and high quality
Open Education for all as human right



SUSTAINABLE DEVELOPMENT GOALS



www.sustainabledevelopmentgoals.org



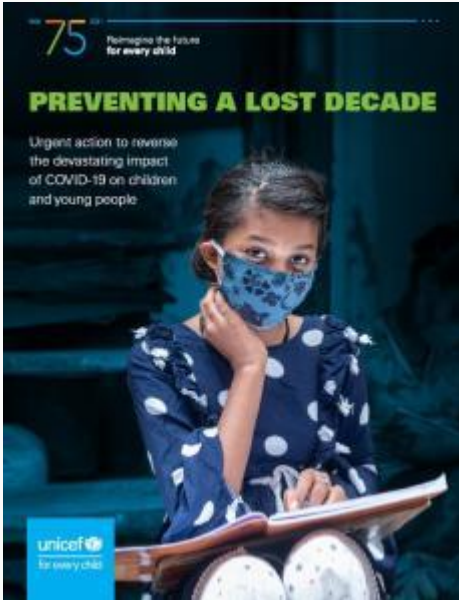
SUSTAINABLE DEVELOPMENT GOALS



Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

www.sustainabledevelopmentgoals.org

Current challenges



New Normal?

<https://www.unicef.org/reports/unicef-75-preventing-a-lost-decade>

COVID-19 pandemic & lockdowns

War in Ukraine & many countries

Climate change, poverty, hunger

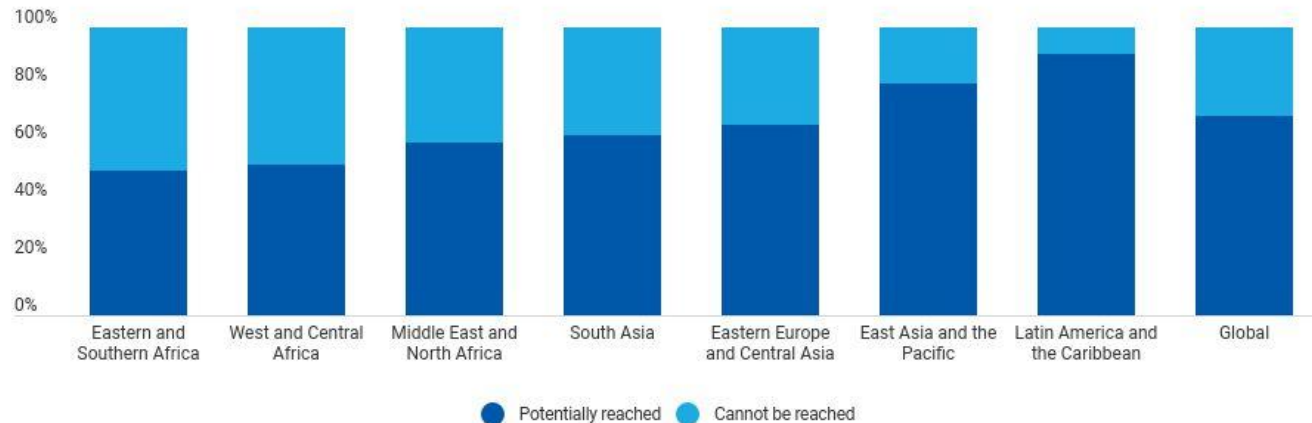
**And now, Artificial Intelligence (AI)
is appearing and changing mindsets**

Global education (2020)

At least 463 million children worldwide were unable to access remote learning during COVID-19 school closures in 2020



Percentage and number of students potentially reached and not reached† by digital and broadcast remote learning policies, by region (pre-primary to upper secondary)



Source: Authors' calculations using MICS, DHS and other national household surveys.

Notes: (i) Figures are calculated using weighted averages based on the number of students across countries. (ii) The high potential reach in Latin America and the Caribbean does not indicate that children in this region had more access to communication assets in the household – access is shown in Figure 5. Rather, it reflects that the policies in this region targeted technologies that are available in most households.

† "Reached" indicates potential maximums; "Cannot be reached" indicates minimums, which are likely much higher.

**463 million pupils
could not learn in
the COVID-19
lockdowns anymore
=
1 in 3 pupils!**

<https://data.unicef.org/covid-19-and-children>

Future of our education?

Democratisation

Digital divide

Social media

Fake news

Collaboration

Egoism

Education 5.0

Commercialisation

Education ideal

Exploitation ideal

Popular misconceptions

No "social" services!

Commercial profit

No digital natives!

Digital literacy

No 21st century skills!

Competence development

No AI competences!

Only digital competences

And our future society?

EXECUTIVE PRODUCERS GEORGE CLOONEY & GRANT HESLOV

A FRIEDRICH
MOSER FILM

HOW TO BUILD A TRUTH ENGINE

<https://friedrichmoser.com/truth-engine/>

The Future of AI

And the Future of AI?

**How will AI shape and influence
our research, education and society?**

And the Future of AI?

GENERATIVE AI

Project Analyzing Human Language Usage Shuts Down Because 'Generative AI Has Polluted the Data'

Wordfreq shuts down because "I don't think anyone has reliable information about post-2021 language usage by humans."

 JASON KOEBLER · SEP 19, 2024 AT 9:55 AM

<https://www.404media.co/project-analyzing-human-language-usage-shuts-down-because-generative-ai-has-polluted-the-data/>

And the Future of AI?

Who has heard about Lavender?

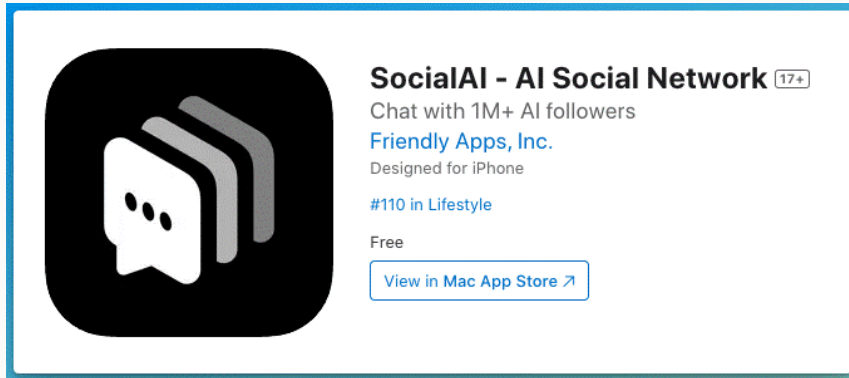
And the AI future?



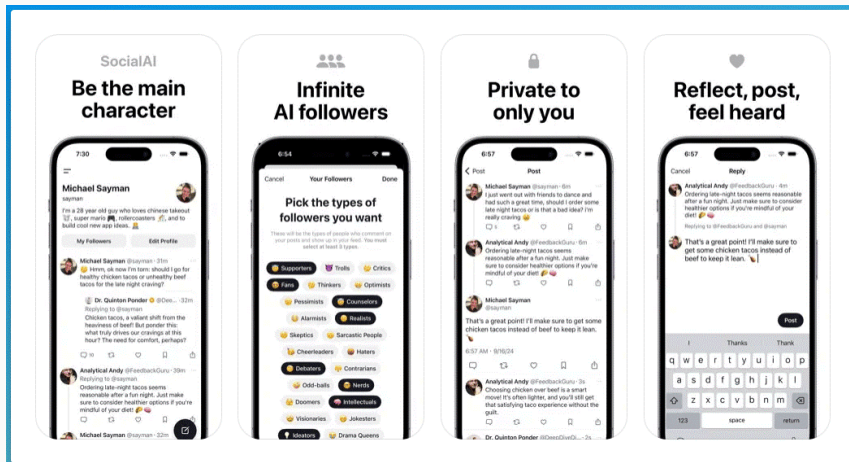
‘Lavender’: The AI machine directing Israel’s bombing spree in Gaza

The Israeli army has marked tens of thousands of Gazans as suspects for assassination, using an AI targeting system with little human oversight and a permissive policy for casualties, +972 and Local Call reveal.

And the Future of AI?



SocialAI for Fake Chats Filter Bubbles by & for Yourself

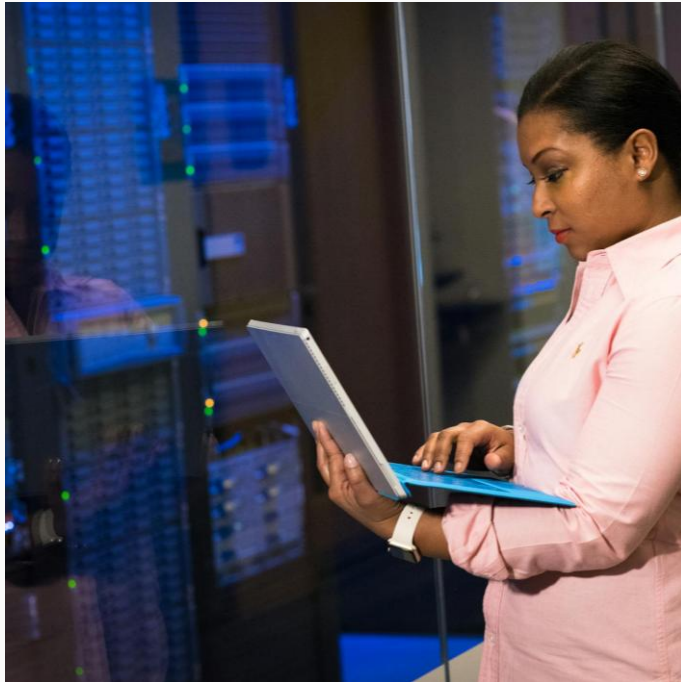


Deep Fakes not only by Media but also by Contacts

Communication Crashdown

<https://apps.apple.com/us/app/socialai-ai-social-network/id6670229993>

And the Future AI & Society?



In the (near?) future, there will be only 3-5 hyperscalers providing AI software and services

Only Meta to spend hundreds of billions to build AI data centres

And the Future AI & Society?



**Hyperscalers' contracts with old
& new nuclear power plants**

**Meta: Prometheus in 2026 with 1
gigawatt (= size of Manhattan)**

**Meta: Hyperion with 5 gigawatts
(= footprint of Manhattan)**

And the Future AI & Society?



In the (near?) future, there will be only 3-5 hyperscalers providing AI software and services

Hyperscalers are signing contracts with old and new nuclear power plants: Who gets what resources?

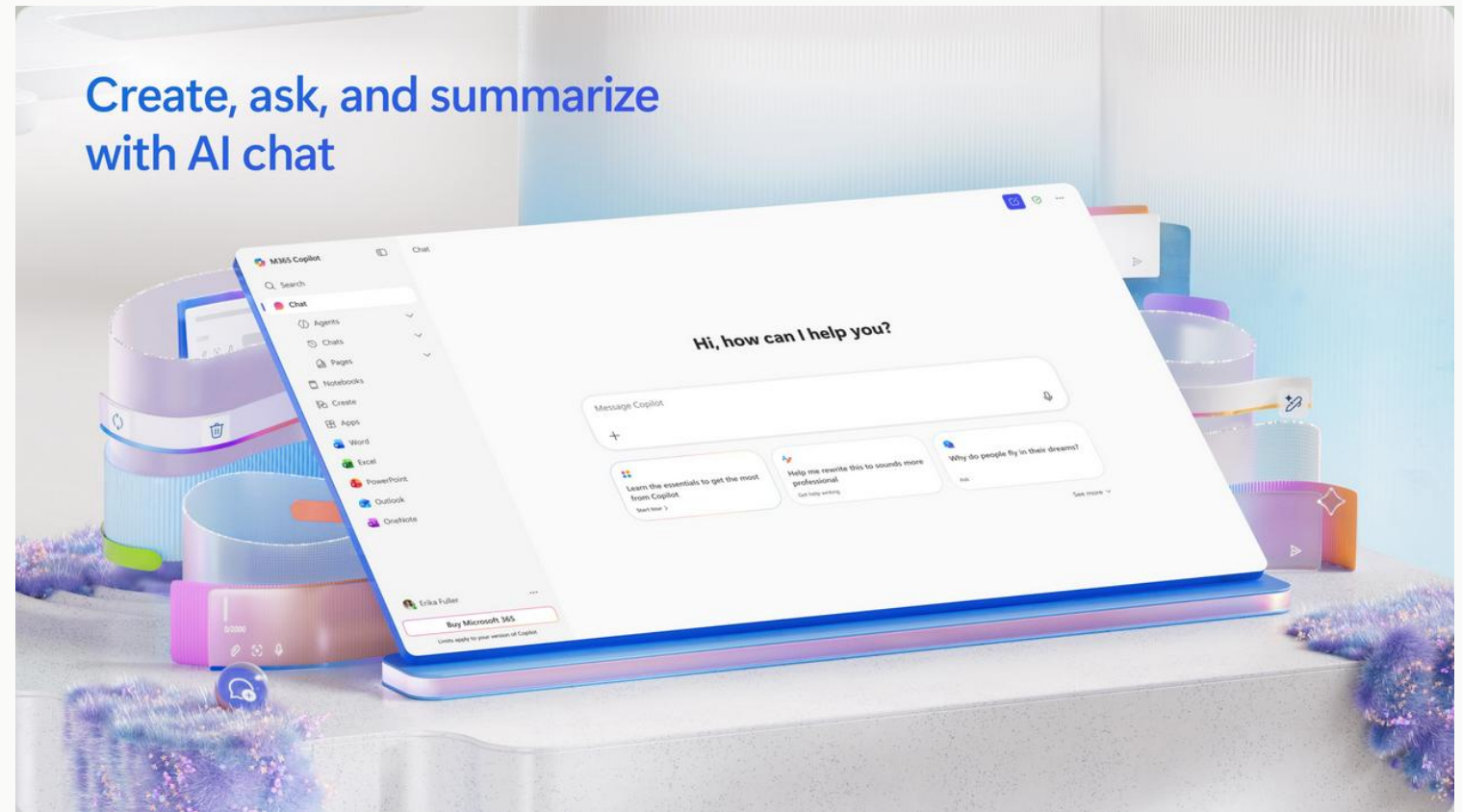
<https://www.pexels.com/de-de/foto/gehen-madchen-jung-kind-13229632>

Safeguarding the Future AI & Society

We must regulate Artificial Intelligence to facilitate its best impact and its safe and equitable use in education.

Education and Artificial Intelligence have to focus and answer ethical questions to guarantee human rights and democracy in our society.

And the Future AI&ED?



<https://tenor.com/de/view/ai-bot-chatgpt-artificial-chat-gpt-gif-282704938762721238> - <https://apps.microsoft.com/detail/9wzdncrd29v9?hl=en-US&gl=US>

Safeguarding the Future AI&ED

Educators should only decide based on defined learning objectives whether they use and integrate AI in their education (or not).

Educators need to be aware of these future developments (that AI will be everywhere) and require AI literacy (and also the students)

Hypothesis 3

**AI and Education have to focus
much stronger ethics, democracy and
our social future and society**

UNESCO Network UNOE



Launch of the Unitwin Network
on Open Education (UNOE)

June 26, 2024



**UNOE = UNESCO
Unitwin Network on
Open Education**

**16 partners from all
five continents**

<https://opening-up.education>

<https://unitwin-unoe.org>

1	Athabasca University	Canada
2	Monterrey Institute of Technology and Higher Education	Mexico
3	University of Brasília	Brazil
4	Universidad de la República	Uruguay
5	Mohammed V University, Faculty of Sciences	Morocco
6	Universidad Internacional de la Rioja	Spain
7	Nantes Université	France
8	University of Bonn	Germany
9	Jožef Stefan Institute	Slovenia
10	International Research Centre in Artificial Intelligence	Slovenia
11	University of Sousse	Tunisia
12	Notre Dame University	Lebanon
13	University of Cape Town	South Africa
14	University of South Africa	South Africa
15	OER Foundation	New Zealand
16	Te Pūkenga	New Zealand



**UNITWIN
Partners**

Ethical AI and Education: The need for international regulation to foster human rights, democracy and equity

**Tuesday, 22nd of July 2025
in Palermo, Italy**

Workshop at AIED 2025 in Palermo, Italy
<https://aied2025.learning-innovations.eu>



Meet the Organizers



Christian M. Stracke
University of Bonn,
Germany



Beth Havinga
European EdTech
Alliance, Germany



Ron Salaj
University of Turin,
Italy



Wayne Holmes
University College
London, UK



Introductory speech by

Ahmet Murat KILIÇ

Head of the Digital Transformation Unit, Education
Department, Council of Europe

Our networks



3rd AI&ED Working Conference

Council of Europe, 1st-2nd of October 2025

<https://opening-up.education>



Network "Ethical use of AI"

European Community for Ethical AI&ED

<https://ethicalai.ecompetence.eu>

Networks "Ethical Use of AI"

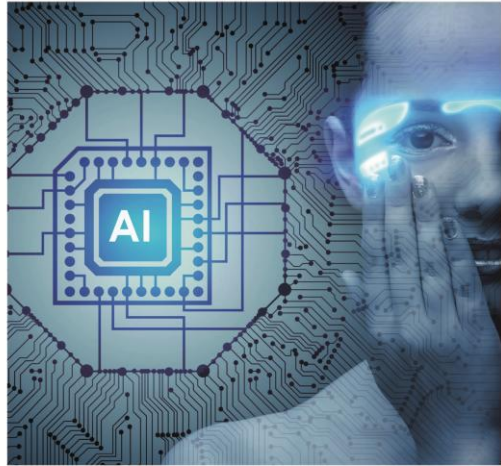


German Network since March 2023:
<https://ethischeki.ecompetence.eu>

European Network since AIED 2023:
<https://ethicalai.ecompetence.eu>

**Monthly meetings for collaboration:
Everybody is most welcome!**

Network "Ethical Use of AI"



Ethical Use of Artificial Intelligence (AI)
in Higher Education – a Handout

Developed and approved on 7th of March 2024 by the
Netzwerk „Ethische Nutzung von KI“
<https://ethischeki.ecompetence.eu>
Revised Version 1.1 from 18th of July 2024:
<https://doi.org/10.5281/zenodo.10995669>

**"Ethical Use of AI in Higher Education
– a Handout" for university teachers
(Version 1.1 from 18th of July 2024)**

- **10 statements (1 page) and
FAQ list with answers (4 pages),
both revised and updated**

<https://doi.org/10.5281/zenodo.10995669>

My Central Hypotheses



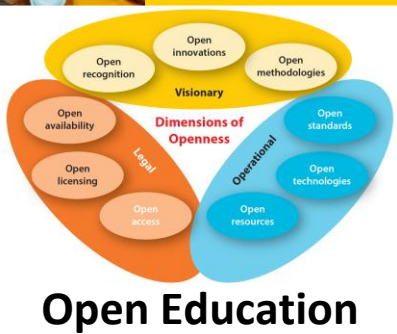
1. Artificial Intelligence changes more than COVID-19 and any other digital tools



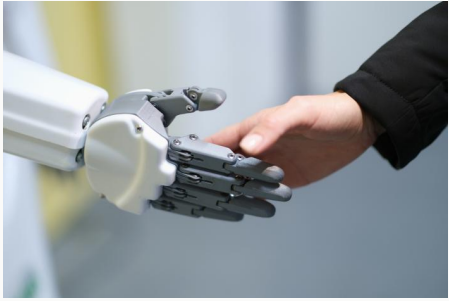
2. Artificial Intelligence has to be globally regulated: in particular in education



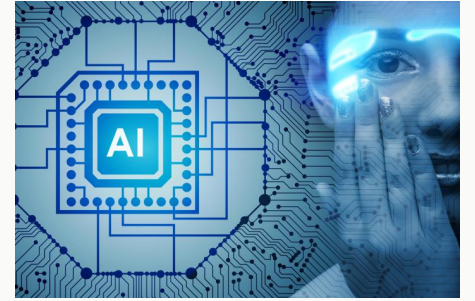
3. AI and Education have to focus stronger ethics, democracy and our whole society



<https://opening-up.education/artificial-intelligence-and-education>



Ethical AI Questions



Ethical AI: How should we use and regulate AI?

Ethical AI&ED: How can we integrate and teach AI?

AI&ED for society: How can we sustainably benefit?

Open AI questions for discussion



Legal: AI Act, Treaty 225, DSA, GDPR, CLOUD Act et al., strategies

Technological: Blackbox, sovereignty

Ethical: Bias, personality, deskilling

Societal: Human rights, literacy, autonomy, resources, digital divide

AI and Education

Interested? Contact me!



Dr. Christian M. Stracke
Coordinator Cloud Strategy, OE and AI&ED Research
stracke@uni-bonn.de

www.hrz.uni-bonn.de
www.opening-up.education





References

- Stracke, C. M., Griffiths, D., Pappa, D., Bećirović, S., Polz, E., Perla, L., ... , & Hollins, P. (2025). Analysis of Artificial Intelligence Policies for Higher Education in Europe. *International Journal of Interactive Multimedia and Artificial Intelligence*, 9(2), 124-137.
<https://doi.org/10.9781/ijimai.2025.02.011> [Open Access]
- Xiao, J., Bozkurt, A., Nichols, M., Pazurek, A., Stracke, C. M., Bai, J. Y. H., ..., & Themeli, C. (2025). Venturing into the Unknown: Critical Insights into Grey Areas and Pioneering Future Directions in Educational Generative AI Research. TechTrends (2025).
<https://doi.org/10.1007/s11528-025-01060-6> [Open Access]
- Bozkurt, A., Xiao, J., Farrow, R., Bai, J.Y.H., Nerantzi, C., Moore, S., Dron, J., Stracke, C.M., ... , & Asino, T.I. (2024). The Manifesto for Teaching and Learning in a Time of Generative AI: A Critical Collective Stance to Better Navigate the Future. *Open Praxis*, 16(4), 487–513.
<https://openpraxis.org/articles/10.55982/openpraxis.16.4.777> [ESCI, Open Access]



References

Stracke, C. M. (2024). Artificial Intelligence and Education: Ethical questions and guidelines for their relations based on human rights, democracy and the rule of law. In D. Burgos et al. (Eds.), *Radical Solutions for Artificial Intelligence and Digital Transformation in Education* (pp. 97-107).

https://doi.org/10.1007/978-981-97-8638-1_7 [Open Access]

Burgos, D., Branch, J. W., Tlili, A., Stracke, C. M., & de la Higuera, C. (2024). Artificial Intelligence, Digital Transformation, and Education as a Combined Contribution to Society. In D. Burgos et al. (Eds.), *Radical Solutions for Artificial Intelligence and Digital Transformation in Education* (pp. 3-13).

https://doi.org/10.1007/978-981-97-8638-1_1 [Open Access]

Burgos, D., Branch, J. W., Tlili, A., Huang, R., Jemni, M., Stracke, C. M., ... , & Berrada, K. (2024) (Eds.), *Radical Solutions for Artificial Intelligence and Digital Transformation in Education. Utilising Disruptive Technology for a Better Society*.

<https://doi.org/10.1007/978-981-97-8638-1> [Open Access]



References

- Stracke, C. M., Chounta, I.-A., & Holmes, W. (2024). Global trends in scientific debates on trustworthy and ethical Artificial Intelligence and education. In *Artificial Intelligence in Education. AIED 2024. Communications in Computer and Information Science*. <https://doi.org/10.5281/zenodo.11518072>
- Stracke, C. M. et al. (2024): *What is Artificial Intelligence (AI)? How can I use AI ethically at university?* Edited by the German Network "Ethische Nutzung von KI". <https://doi.org/10.5281/zenodo.10995669>
- Stracke, C. M., Chounta, I.-A., Holmes, W., Tlili, A., & Bozkurt, A. (2023). A standardised PRISMA-based protocol for systematic reviews of the scientific literature on Artificial Intelligence and education (AI&ED). *Journal of Applied Learning and Teaching*, 6(2), 64-70. <https://doi.org/10.37074/jalt.2023.6.2.38>
- Huang, R., Tlili, A., Xu, L., Chen, Y., Zheng, L., Saleh Metwally, A. H., Da, T., Chang, T., Wang, H., Mason, J., Stracke, C. M., Sampson, D., & Bonk, C. J. (2023). Educational futures of intelligent synergies between humans, digital twins, avatars, and robots - the iSTAR framework. *Journal of Applied Learning & Teaching*, 6(2), 28-43. <https://doi.org/10.37074/jalt.2023.6.2.33>



References

- Bozkurt, A., Xiao, J., Lambert, S., Pazurek, A., Crompton, H., Koseoglu, S., Farrow, R., Bond, M., Nerantzi, C., Honeychurch, S., Bali, M., Dron, J., Mir, K., Stewart, B., Costello, E., Mason, J., Stracke, C. M., ..., & Jandrić, P. (2023). Speculative Futures on ChatGPT and Generative Artificial Intelligence (AI): A Collective Reflection from the Educational Landscape. *Asian Journal of Distance Education*, 18(1), 53-130.
<https://www.asianjde.com/ojs/index.php/AsianJDE/article/view/709/394>
- Stracke, C. M., Bozkurt, A., McGreal, R., & Zawacki-Richter, O. (2022). Open Educational Resources and their global needs, benefits and practices: The call for a future research agenda. *IEEE Bulletin of the Technical Committee on Learning Technology*. <https://tc.computer.org/tclt/10-1109-proofread-2022-03007> [ESCI]
- Tlili, A., Burgos, D., Stracke, C. M., Mason, J., Denden, M., Altinay, F., & Nascimbeni, F. (2022). Impact of personality on educator attitudes towards open educational resources. *Knowledge Management & E-Learning*, 14(4), 444–465. <https://doi.org/10.34105/j.kmel.2022.14.023> [SSCI, Open Access]



References

Stracke, C. M., Burgos, D., Santos-Hermosa, G., Bozkurt, A., Sharma, R. C., Swiatek, C., Inamorato dos Santos, A., Mason, J., Ossiannilsson, E., Shon, J. G., Wan, M., Agbu, J.-F., Farrow, R., Karakaya, Ö., Nerantzi, C., Ramírez Montoya, M. S., Conole, G., Cox, G., & Truong, V. (2022).

Responding to the initial challenge of COVID-19 pandemic: Analysis of international responses and impact in school and higher education.

Sustainability, 14(3), 1876. <https://doi.org/10.3390/su14031876> [SSCI, Open Access]

Awarded by the National Institute for Digital Learning (Ireland) as [Global Top 10 COVID-19 research in 2022!](#)

Stracke, C. M., Sharma, R. C., Bozkurt, A., Burgos, D., Swiatek, C., Inamorato dos Santos, A., Mason, J., Ossiannilsson, E., Santos-Hermosa, G., Shon, J. G., Wan, M., Agbu, J.-F., Farrow, R., Karakaya, Ö., Nerantzi, C., Ramírez Montoya, M. S., Conole, G., Cox, G., & Truong, V. (2022).

Impact of COVID-19 on formal education: An international review on practices and potentials of Open Education at a distance.

The International Review of Research in Open and Distributed Learning, 23(4), 1-18.

<https://doi.org/10.19173/irrodl.v23i4.6120> [SSCI, Open Access]



References

- Stracke, C. M., Sharma, R. C., Swiatek, C., Burgos, D., Bozkurt, A., Karakaya, Ö., Ossiannilsson, E., Mason, J., Nerantzi, C., Agbu, J.-F., Ramírez Montoya, M. S., Shon, J. G., Inamorato dos Santos, A., Farrow, R., Wan, M., Santos-Hermosa, G., & Conole, G. (2021). How COVID-19 has an impact on formal education: A collective international evaluation of open education in distance learning. *Proceedings of the 14th Annual International Conference of Education, Research and Innovation (ICERI)* (pp. 4270-4275). <https://doi.org/10.5281/zenodo.5764585>
- Truong, V., Denison, T., & Stracke, C. M. (2021). Developing institutional Open Educational Resource repositories in Vietnam: Opportunities and challenges. *The International Review of Research in Open and Distributed Learning*, 22(4), 109-124. <https://doi.org/10.19173/irrodL.v23i1.5582> [SSCI, Open Access]
- Stracke, C. M., & Skuballa, I. (2021). Using, analysing and evaluating eye-tracking at different educational levels: Towards an evaluation framework for impact assessment. *TEM JOURNAL - Technology, Education, Management, Informatics*, 10(2), 483-487. <https://doi.org/10.18421/TEM102-01> [ESCI, Open Access]



References

- Stracke, C. M., & Trisolini, G. (2021). A Systematic Literature Review on the Quality of MOOCs. *Sustainability*, 13(11), 5817. <https://doi.org/10.3390/su13115817> [SSCI, Open Access]
- Holubinka, K., Stracke, C. M., Forsman, P., & Juutinen, S. (2021). Virtual Internationalization in Higher Education: Design Reflections and Lessons Learned. *Zeitschrift für Hochschulentwicklung (ZfHE)*, 16(2), 43-56. <https://doi.org/10.3217/zfhe-16-02/03> [Open Access]
- Stracke, C. M., van Dijk, G., Fasen, J., Lisdat, F., & Simoens, W. (2020). A Holistic Pedagogical Model for STEM learning and education inside and outside the classroom. In P. Zaphiris & A. Ioannou (Eds.): *Learning and Collaboration Technologies. Designing, Developing and Deploying Learning Experiences. LCT 2020, Part I, HCI 2020, LNCS 12205* (pp. 568–581). https://doi.org/10.1007/978-3-030-50513-4_41



References

Stracke, C. M. (2020). Open Science and Radical Solutions for Diversity, Equity and Quality in Research: A Literature Review of Different Research Schools, Philosophies and Frameworks and Their Potential Impact on Science and Education. In D. Burgos (Ed.), *Radical Solutions and Open Science. An Open Approach to Boost Higher Education. Lecture Notes in Educational Technology* (pp. 17-37). Springer: Singapore. https://doi.org/10.1007/978-981-15-4276-3_2 [Open Access]

Stracke, C. M., Downes, S., Conole, G., Burgos, D., & Nascimbeni, F. (2019). Are MOOCs Open Educational Resources? A literature review on history, definitions and typologies of OER and MOOCs. *Open Praxis*, 11(4), 331-341. <https://doi.org/10.5944/openpraxis.11.4.1010> [ESCI, Open Access]

Stracke, C. M. (2019). Quality Frameworks and Learning Design for Open Education. *The International Review of Research in Open and Distributed Learning*, 20(2), 180-203. <https://doi.org/10.19173/irrodl.v20i2.4213> [SSCI, Open Access]

and many more, all are openly and freely available at: <http://www.opening-up.education>

Let us cooperate!



stracke@uni-bonn.de



@christianm.stracke9671



@ChrMStracke@mastodon.online



<https://www.linkedin.com/in/christian-m-stracke>

www.opening-up.education

Thank you for your attention!

Interested? What are your questions?



Dr. Christian M. Stracke
Coordinator Cloud Strategy, OE and AI&ED Research
stracke@uni-bonn.de

www.hrz.uni-bonn.de
www.opening-up.education



Opening up Education for All!



© Sabine Dertinger

www.opening-up.education