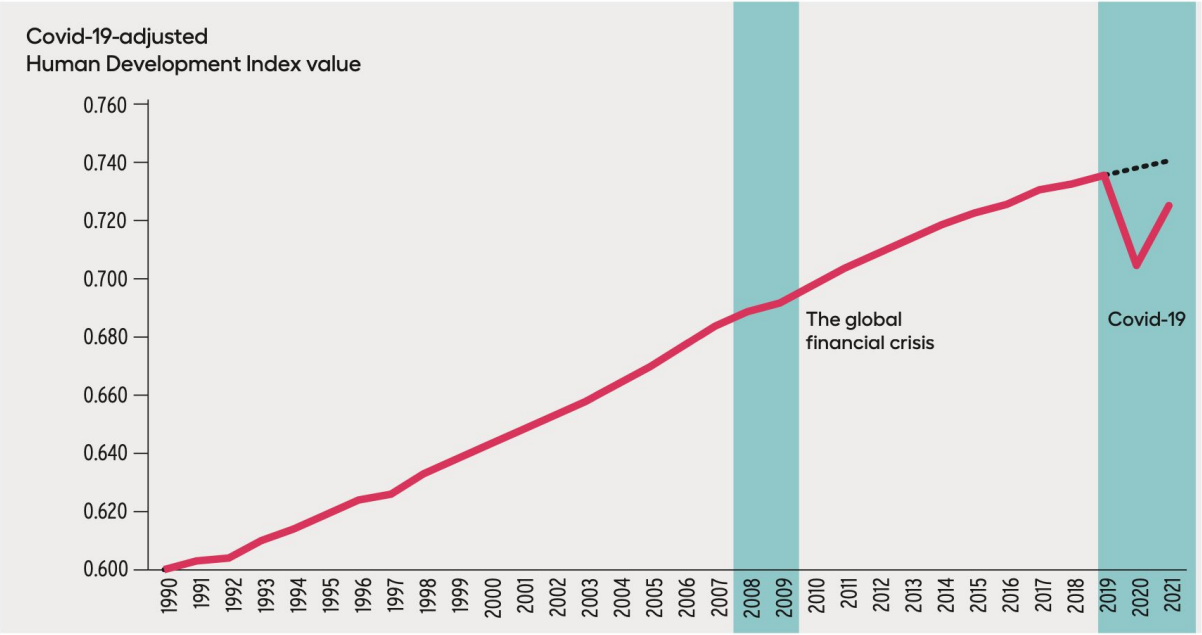
TEACHING YOUTH TO USE AI TO TACKLE THE SUSTAINABLE DEVELOPMENT GOALS

TECHNOVATION

United Nations | UN News
Global perspective Human stories

‘Tremendously off track’ to meet 2030 SDGs: UN chief



Source: Human Development Report Office (see box 1.1).

YOUTH FEEL ANXIOUS ABOUT THE WORLD THEY ARE ABOUT TO ENTER

nature

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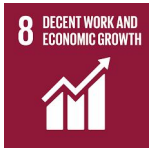
NEWS | 22 September 2021

Young people's climate anxiety revealed in landmark survey

Children worldwide worry about the future and feel let down by governments, a huge study on attitudes towards climate change has found.

Girls' education strengthens economies and creates jobs (adding ~35% to GDP for some)



Communities are more stable and can recover faster after conflict — when girls are educated.

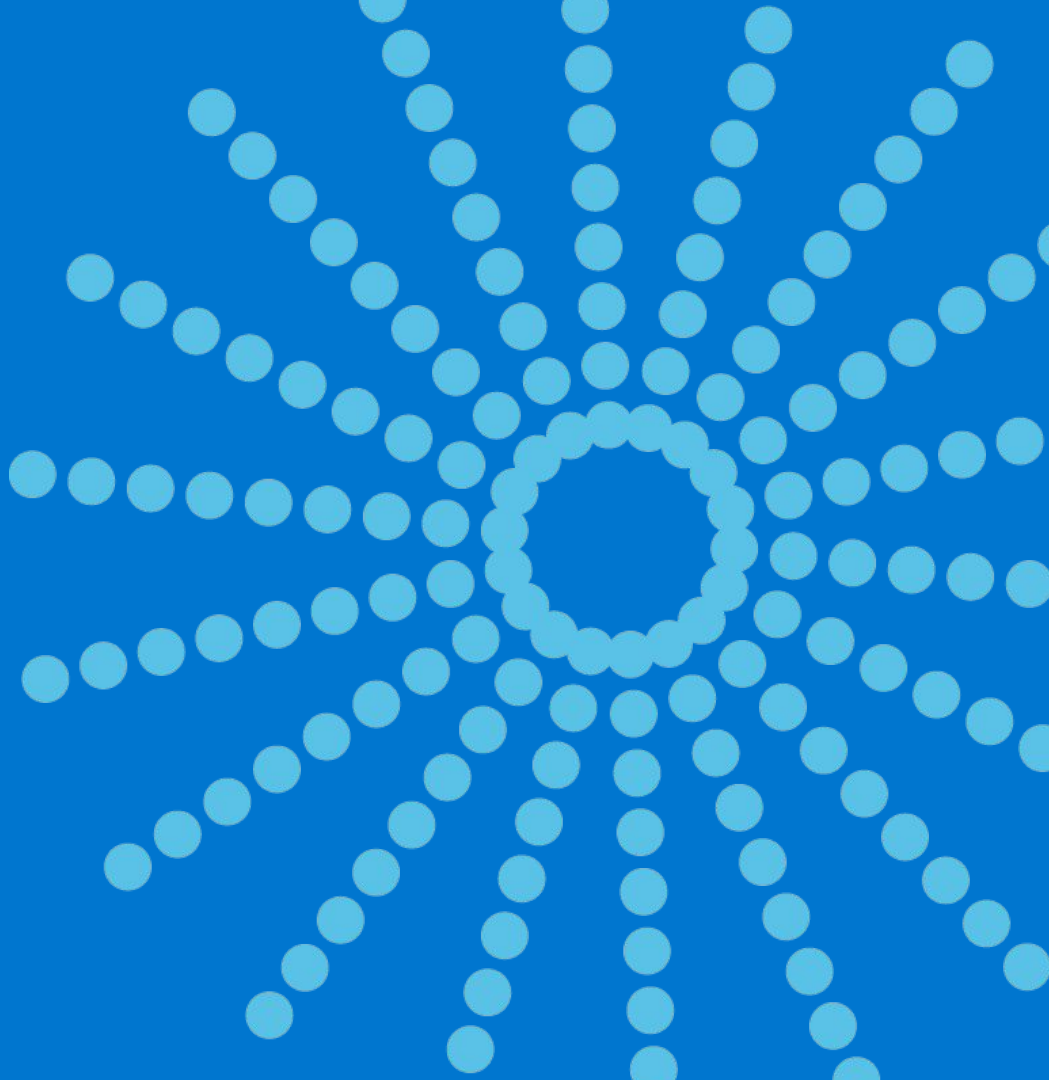
GIRLS' EDUCATION IS AT THE HEART

OF SUSTAINABLE DEVELOPMENT

Educated girls are healthier citizens who raise healthier families.

5th most effective carbon drawdown strategy

THERE ARE 900 MILLION TEENAGE GIRLS IN THE WORLD



Self-efficacy, agency & purpose

Entrepreneurial skills

Digital skills

Foundational skills

We have the technology, the tools, the infrastructure and a research-based blueprint to empower millions of girls to lead sustainable development.

HIGH-IMPACT, GLOBAL PROGRAM CHECKLIST

FOR ADOLESCENTS

1 Choice

2 Work in teams

3 Build a sense of purpose & identity

4 Supported by warm, caring mentors

5 Physiologically thrilling

(Bandura, 1997; Steinberg, 2015)

TECHNOVATION: MENTORS & GIRLS (AGES 8-18) TACKLE SDGS USING TECHNOLOGY (OVER 12-WEEKS)

Girls Solving SDGs with AI

WEEK 1

Get to know your community, the problems they face, and how to best solve a problem with a mobile phone. You will also choose an app builder to build your app with.

- Understanding your Community
- Brainstorming Problems
- Solving Problems with Mobile Phones
- Solving Problems with Artificial Intelligence
- Exploring Different App Builders

WEEK 2

Come up with a solution to your problem, and do some marketing research to make sure it's the best solution possible. Learn some basics of programming.

- Researching and Selecting Problems
- Brainstorming Solutions
- Market Research
- Problem Statement
- Algorithms and Pseudocode

WEEK 3

Plan out the best way to tackle your solution. Create a business around your app idea and write a mission statement. Learn about event handlers.

- Minimum Viable Product
- Businesses and Mission Statements
- Events Handlers
- All About AI
- AI or Mobile App or Both?

WEEK 4

Wrap up your idea with a project canvas. Solve your first coding challenge and learn about branding.

- Paper and Cardboard Prototyping
- Project Canvas
- Coding Challenge 1
- Data and Functions
- Brands
- Find Patterns with AI

WEEK 5

Learn how to visually express your business's identity, learn about variables and lists.

- Color Schemes
- Typefaces
- Variables
- Lists
- Datasets

WEEK 6

Brand your app and learn about conditionals.

- Logos
- Marketing your Project
- If / Else Conditionals
- Coding Challenge 2
- Positive Impact of your Project
- Train your AI Model

WEEK 7

Continue coding your app and create your business model.

- Calculating Revenue
- Operating Costs and Business Models
- If / Else / Else If Conditional Statements
- Advanced Logic and Conditionals
- Software Options for your AI Model

WEEK 8

Learn about loops and sensors and write your business plan.

- Outline Your Pitch Video
- User Adoption Plan [Junior Division]
- Business Plan [Senior Division]
- Loops
- Components and Sensors

WEEK 9

Learn to code databases & APIs, and create your pitch video.

- Record Your Pitch Video
- Outline Your Demo Video
- Storing Data Locally
- Cloud Storage and APIs

WEEK 10

Edit your pitch video and debug your app.

- Edit Your Pitch Video
- Record and Edit Your Demo Video
- Debugging Tips

WEEK 11

Practice pitching your idea and prepare your submission materials.

- Learning Journey

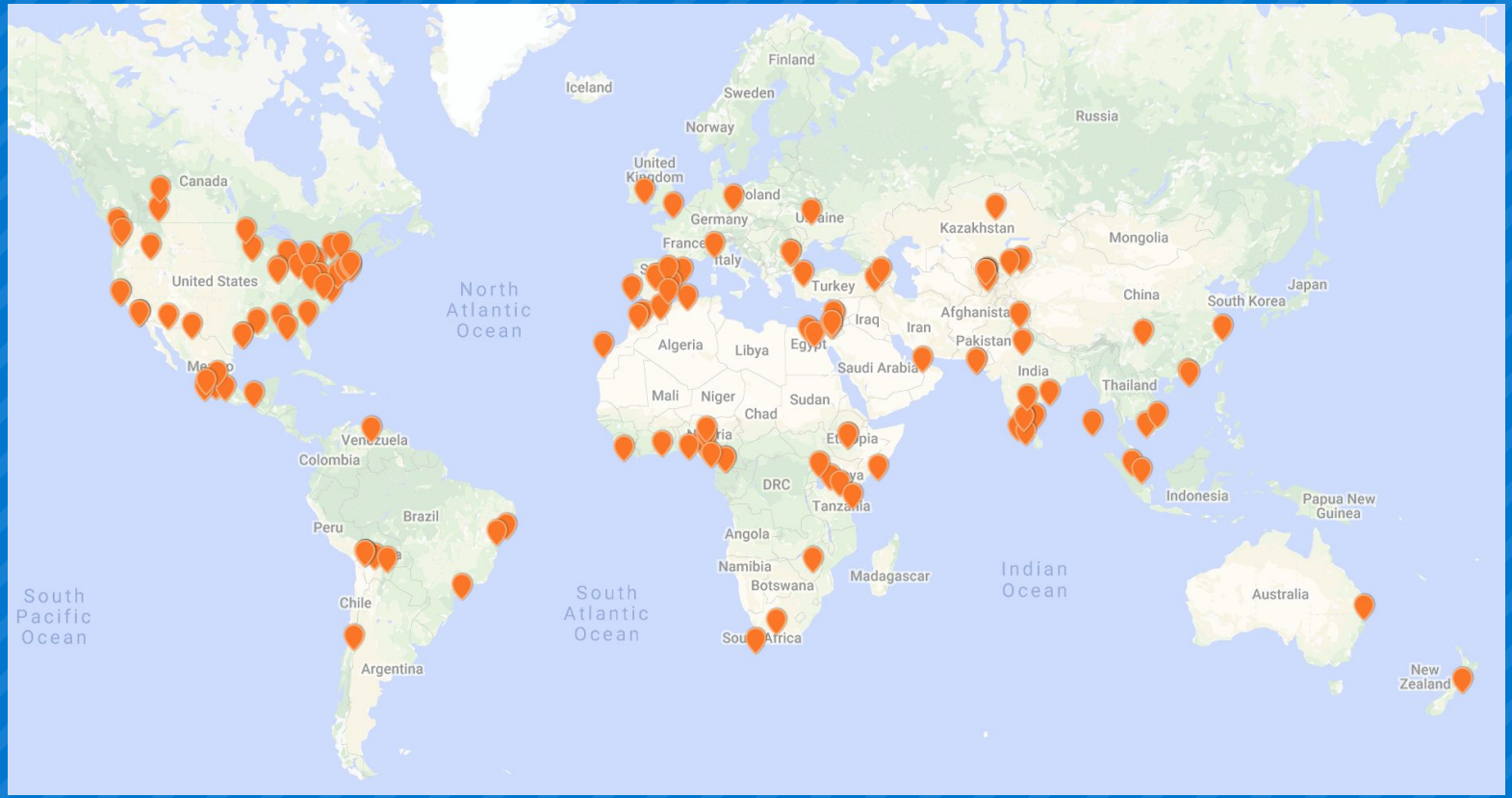
WEEK 12

Follow a walk through on how to submit your idea and planning for after the season!

- Submitting to the Competition

Impact results published in [KI - Künstliche Intelligenz](), German Journal of Artificial Intelligence

350,000 participants, 120+ countries



GIRLS TACKLING REAL-WORLD PROBLEMS WITH AI (~1000 PROTOTYPES)

NewsBear (Canada)
Combating fake news

SafeDrive (Kenya)
Protecting drivers by predicting auto collisions

EatAware (Canada)
Using AI to teach healthy eating habits

RespirAr (Brazil)
Evaluating daily pollution data to alert about unsafe air

Hands with Voice (Mexico)
Using AI to help deaf people communicate

SmartCare (India)
Helping elders navigate technology and stay independent

22,500 CHILDREN & PARENTS SOLVING REAL-WORLD PROBLEMS WITH AI

22,500 under-resourced 3rd-8th grade students, parents and educators engaged

91% of students increased their self-efficacy as STEM learners

87% of parents indicated greater capability to support STEM learning at home

100% of educators learned better ways to stimulate a student's interest in STEM

TECHNOVATION - INCREASING YOUNG WOMEN'S SELF-EFFICACY & FINANCIAL CAPACITY, WHILE ALSO CHANGING SOCIAL NORMS

Celebrating a decade of partnering with Technovation

Jan 12, 2022 · 4 min read

Maggie Johnson
VP, Education and Research Operations

Share

TECHNOVATION: SUSTAINED IMPACT

- 350,000 participants engaged across 100+ countries
- 150,000 young women alumnae trained as technology entrepreneurs & innovators
- 76% of alumnae are pursuing STEM degrees (WestEd, 2020)
- 60% of alumnae are working in STEM careers
- 50% of alumnae are leading change in their communities & being honored
- 60% of alumnae credit Technovation for their career choice & increasing their self-efficacy

Technovation Minnesota team invited to the White House Science Fair, 2015

Emma Yang, Featured in Apple's 2018 WWDC keynote

Gitanjali Rao, 3-time Technovation participant

GraAkpoiroro, 2015 Technovation winner & finalist in 2020 XPRIZE Next-Gen Mask Challenge

2022 SEASON

A CONTINUUM OF SUPPORT FOR GIRLS & YOUNG WOMEN

8-12 year old girls supported by **Parents** & Mentors

BEGINNER DIVISION

13-15 year old girls supported by Mentors

JUNIOR DIVISION

16-18 year old girls supported by Mentors

SENIOR DIVISION

Alumna support

TECHNOVATION

BEGINNER DIVISION

Technovation Girls Beginner Division is for girls ages 8-12 and their parent / caregivers to work together to learn about app development and artificial intelligence while solving a problem that matters to them! Let's get started.

- Level: Beginner
- Study time: 40+ hours
- Duration: 12 weeks

STATE OF AI EDUCATION

REVIEW OF K-12 (GOVT. ENDORSED) AI CURRICULA

Only a handful

Country/ region	Curriculum title	Curriculum developer[15]	Educational levels		
			Primary	Middle	High
Armenia	Curriculum of ICT	Government		X	X
Austria	Data Science and Artificial Intelligence	Federal Ministry of Education, Science and Research			X
Belgium	IT Repository	*Fédération Wallonie-Bruxelles* (French-speaking Community of Belgium)			X
China	AI curriculum embedded in the Information Science and Technology curriculum	The Ministry of Education of the People's Republic of China	X	X	X
India	Atal Tinker Labs AI modules	Atal Tinker Labs, Atal Innovation Mission, NITI Aayoag		X	X
Republic of Korea	'AI Mathematics' under the Mathematics Subject Group for high schools	Korea Foundation for the Advancement of Science and Creativity			X
	'AI Basics' under Technology Home Economics Subject Group for high schools	Korea Foundation for the Advancement of Science and Creativity			X
Kuwait	Standards curriculum	Curricula technical guidance experts and teachers	X	X	
Portugal	Information and Communication Technologies	State school teachers of ICT and Mathematics	X	X	X
Qatar	Computing and Information Technology	Binary Logic, Ministry of Education and Higher Education	X	X	X
	Computing and Information Technology (High Tech Track)	Binary Logic, Ministry of Education and Higher Education			X
Serbia	Informatics and programming – Grade 8	Ministry of Education working group		X	
	Modern technologies in gymnasiums – Grade 3 and 4	Ministry of Education working group			X
United Arab Emirates	AI curriculum embedded under the Technology Subject Framework	Ministry of Education	X	X	X

Source: UNESCO (2021*b*)

Table 5. Governmental K–12 AI curricula in development

Country/ region	Curriculum title	Curriculum developer	Educational levels		
			Primary	Middle	High
Germany	1. Identifying and Formulating Algorithms *[Algorithmen erkennen und formulieren]*	Standing Conference of the Ministers of Education and Cultural Affairs of the Länder	X	X	X
Jordan	2. Digital Skills	National Center for Curriculum Development		X	X
Bulgaria	3. Computer Modelling, Information Technology and Informatics	Expert groups (academia, teachers, education experts)	X	X	X
Saudi Arabia	4. Digital Skills	Binary Logic and Tatweer Co.	X	X	X
Serbia	5. Technique and Technology	Ministry of Education working group		X	
	6. AI in gymnasiums	Ministry of Education working group			X
	7. AI in all high schools	Ministry of Education working group			X

Source: UNESCO (2021*b*)

Table 6. Non-governmental AI curricula included in the study as benchmarks

Country/ region	Curriculum title(s)	Curriculum developer	Educational levels		
			Primary	Middle	High
International	1. IBM EdTech Youth Challenge	IBM		X	X
	2. AI Youth Skills	Microsoft		X	X
	3. Global AI Readiness Program (High Tech Track)	Intel		X	X
	4. Global AI Readiness Program (General Track)	Intel		X	X
United States	5. DAILy Curriculum	MIT		X	X

Source: UNESCO (2021*b*)

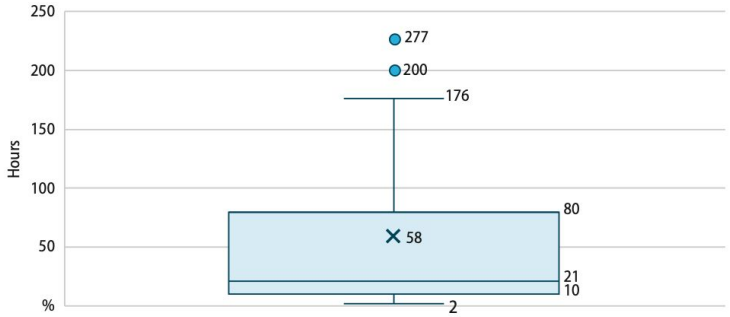
AVERAGE LENGTH OF CURRICULUM

Table 9. Curriculum engagement by topic area

	AI foundations	Ethics and social impact	Understanding, using and developing AI
Number of curricula covering the topic area (n = 21)	20	20	18
Range of hours	0–432	0–185	0–465
Average hour commitment (all)	99.8	29.7	39.0
Average hour commitment (for those with allocations)	104.8	31.2	45.5
Median hour commitment (for those with allocations)	31.3	13.7	11.9

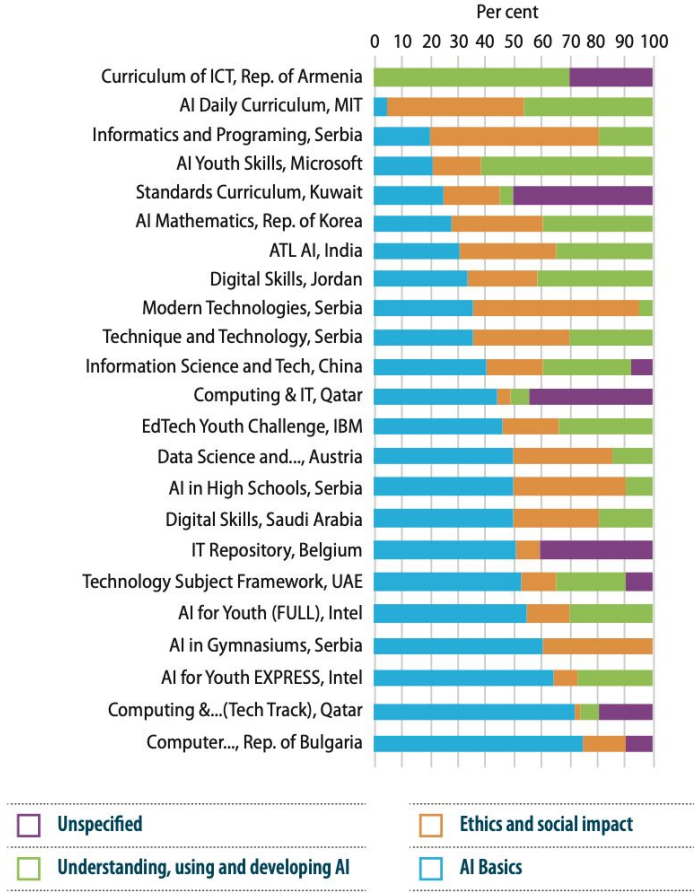
Source: UNESCO (2021*b*)

Figure 2. Time allocation per year of AI curricula, n = 22



Source: UNESCO (2021*b*)

ALLOCATION OF CURRICULUM TIME



Source: UNESCO (2021*b*)

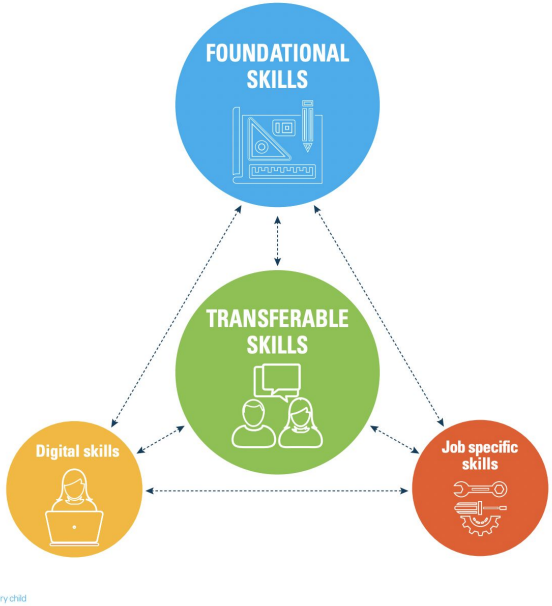
INFORMAL AI EDUCATION PROGRAMS - ELEMENTS OF AI, MACHINE LEARNING FOR KIDS, AI SINGAPORE, MIT RAISE, TECHNOVATION

	Machine learning for Kids	AI Singapore	Technovation	Elements of AI	MIT RAISE
Years implemented	5	5	5	4	1
No. reached	LOTS!	50,000+	22,500	760,000	~2500
Impact data	LOTS of projects created!		1000 AI-prototypes Student, parent, educator self-efficacy		

(UNESCO'S) KEY RECOMMENDATIONS FOR AI CURRICULUM

Need:

1. Impact data and evidence on the quality and effectiveness of AI curricula
2. Focus on the main values and skills needed for work and life in the AI era
3. To be project-based & fun
4. Teacher training



EMPOWERING YOUTH TO DEVELOP BETTER AI-BASED SOLUTIONS FOR REAL WORLD PROBLEMS

APPROACH

- Categorize SDGs to facilitate problem solving
- Leverage citizen science frameworks to tackle real-world problems
    - Combine crowdsourcing and satellite data analysis
- Develop System Maps & Coding Tutorials for each SDG

SPECIFIC TECH FOR SPECIFIC SDGS (NATURE, 2021)

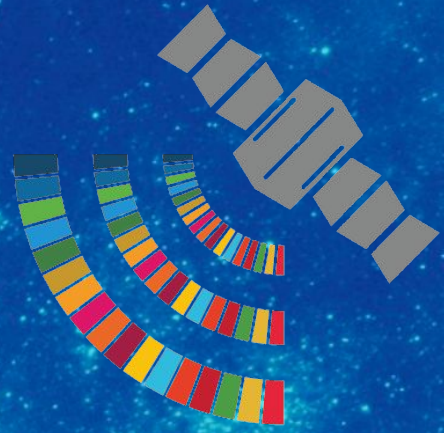
PLANETARY INTEGRITY

MATERIAL NEEDS

PEOPLE

PROSPERITY

PEACE

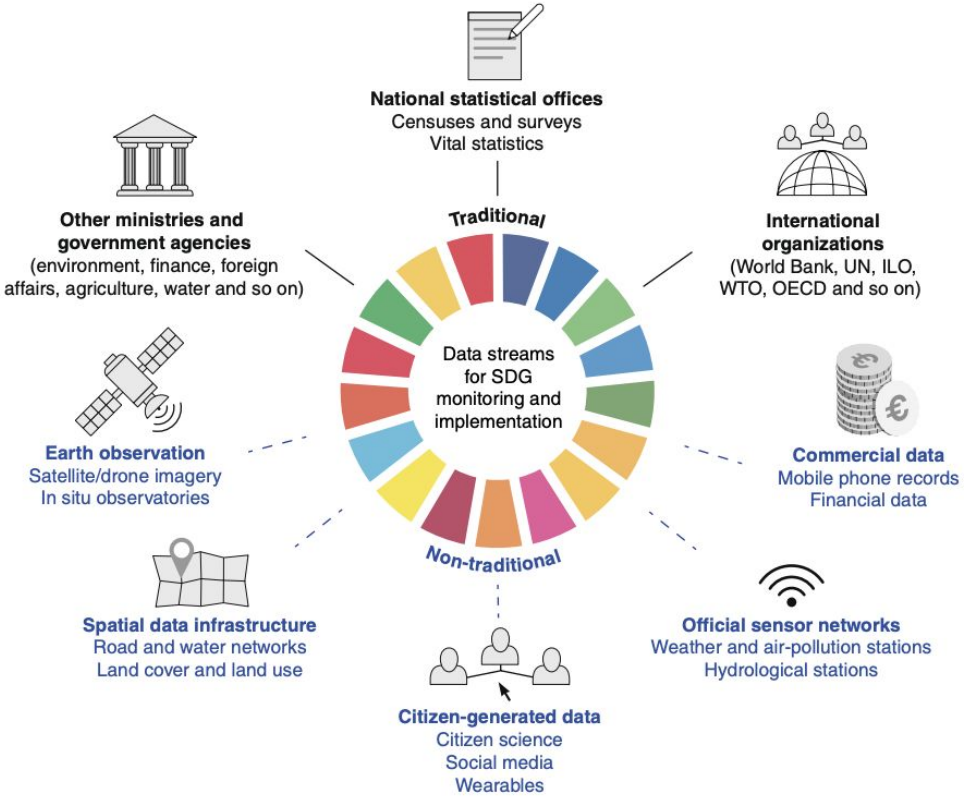


SPACE4SDGS

UNITED NATIONS
Office for Outer Space Affairs

TECHNOVATION

CITIZEN SCIENCE MODELS + MOBILE, GROUND-DATA + SATELLITE DATA + AI→ INNOVATIVE SOLUTIONS TO THE SDGS



CURRICULUM & TRAINING IMPROVEMENTS

System maps for SDGs 6, 12 and 13 (water, climate action and responsible consumption) to help girls develop apps that incorporate at least 2 of the 5 elements below

Collect Data & Raise Awareness

Motivate Behavior Change

Build Empathy

Implement & Track

Finance

METRIC OF SUCCESS: INCREASING FINANCIAL CAPABILITY

Significant gains in **Resources, Agency & Achievement** for all participants, leading to resilient communities

Resources* (preconditions)

Examples:
- Human capital
- Financial capital
- Social capital
- Physical capital

Agency (process)

Examples:
- Voice
- Participation
- Decision-making

Achievements (outcomes)

Examples:
- Education
- Health & nutrition
- Income generation & assets

J-PAL
ABDUL LATIF JAMEEL POVERTY ACTION LAB

A PRACTICAL GUIDE TO MEASURING WOMEN'S AND GIRLS' EMPOWERMENT IN IMPACT EVALUATIONS

Rachel Glennerster*, Claire Walsh, Lucia Diaz-Martin

BUILDING RESILIENT COMMUNITIES

Increase in:

1. Social capital (mentors) for underserved communities
2. Volunteerism and civic engagement
3. AI capacity for underserved communities
4. Open-mindedness and ability to accept change for community members

(Wilson G., 2012, Sharifi A, 2016, Rights & Resilience)

Girls' education strengthens economies and creates jobs (adding ~35% to GDP for some)

Communities are more stable and can recover faster after conflict — when girls are educated.

EMPOWERED YOUNG WOMEN WILL LEAD US TO

A WORLD WHERE PEOPLE & THE PLANET THRIVE

Educated girls are healthier citizens who raise healthier families.

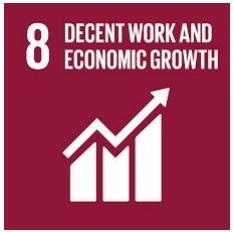
5th most effective carbon drawdown strategy

GIRLS SOLVING REAL-WORLD PROBLEMS WITH TECHNOLOGY ENTREPRENEURSHIP

Helping young people become entrepreneurs *(Kenya)*

Charity Feasts - Sharing feasts with the hungry *(Egypt)*

Violentometro - Reducing domestic violence *(Mexico)*



Help COVID teenage mothers finish school/learn entrepreneurship *(Kenya)*

Monitoring Forest Fires *(Cambodia)*

Helping groups develop more empathy *(Ukraine)*