Why STEM?

S Science
T Technology
E Engineering
M Mathematics

Because STEM is all around us.

- DO YOU LIKE TAKING PHOTOS?
- DO YOU HEAT YOUR FOOD IN A MICROWAVE?
- DO YOU USE AN INDUCTION OR CERAMIC HOB?
- DO YOU WEAR SPORTS CLOTHES?
- DO YOU GO ON HOLIDAYS BY PLANE?
- DO YOU DRINK PASTEURIZED MILK FROM A CARTON BOX?

All this is at least partly available thanks to the efforts of scientists, researchers, engineers and technicians who all possess STEM skills.

Employment chances of STEM occupations are growing.

Employers are in demand for STEM workers.

Careers in STEM are the future.

Skills of the future – jobs that did not exist 10 years ago:

1. App developer
2. Driverless car engineer
3. Cloud computing specialist
4. Logistics & supply chain drone manager
5. Sustainable agriculture reversal scientist

New STEM jobs will gradually emerge in following years as 65% of children, who start primary schools today will end up being engaged in jobs that have not existed yet.

65%

43%

By 2027 there will be 43% shortfall in STEM skills and 1 in 10 STEM jobs will go unfilled.

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Do you know any of these STEM facts below?

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SOME JELLYFISH CAN LIVE FOREVER.

Scientists have discovered a jellyfish Turritopsis dohrnii, now officially known as the only immortal creature.

Become:
a marine biologist
Study: biology

AN AVERAGE HUMAN BODY CONTAINS ENOUGH IRON TO CREATE A 7,5 CM LONG NAIL.

Iron is distributed throughout a body in haemoglobin, tissues, muscles, bone marrow, etc.

Become:
a doctor, molecular biologist
Study: medicine, biosciences

VIRTUAL REALITY (VR) HELPS IN OVERCOMINGE PHOBIAS.

Some hospitals use VR therapy to help patients overcome phobias. This is possible due to successful collaboration amongst software developers and doctors.

Become:
a software developer
Study: computer sciences

THE HIGHEST SKYSCRAPER IN THE WORLD IS 828 M HIGH.

That is Burj Khalifa in Dubai. By 2020 Jeddah Tower in Saudi Arabia, over 1 km high, will become the tallest building in the world.

Become:
a structural engineer
Study: civil engineering

DOES MEMORY CARDS GET HEAVIER WHEN IT IS FULL?

No, it doesn't, because even being empty it contains data in a form of 1 and 0. When the data is stored only the order of numbers 1 and 0 is changed.

Become:
a hardware developer
Study: computer sciences

Do you want to be a part of such discoveries, collaborations or innovative engineering?

THERE IS SO MUCH MORE TO DISCOVER, INVENT AND BUILD!

Roughly **8,2 million** STEM job openings are forecasted in the EU by **2025**.

Become a STEM expert → choose a STEM carrier!

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Opportunities are growing!
TOMORROW'S JOBS = STEM JOBS

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INCREASED NEEDS FOR STEM PROFESSIONALS IN THE EU LEAD TO BETTER EMPLOYMENT CHANCES FOR YOUTH IN FUTURE.

STEM occupations are projected to grow almost **twice as fast** as the average rate of all occupations.

TOP 5 of the best paying STEM jobs

1 ACTUARY

An expert with knowledge in business, economics, and mathematics giving financial advice to non-specialists.

Degree in: mathematics, business, economics, finance, engineering

Earnings: up to 67 000 €

2 INFORMATION SECURITY ANALYST

Information security analyst work involves developing new ways to improve a company's security, writing reports on its efficiency, documenting/simulating security breaches and recognising IT flaws.

Degree in: computer sciences, IT sciences

Earnings: up to 67 000 €

3 PETROLEUM ENGINEER

Petroleum engineers' work within several subsectors (completion, drilling, production, and reservoir) includes finding ways to efficiently extract oil and gas from below the earth's surface.

Degree in: engineering

Earnings: up to 105 000 €

4 SYSTEMS DEVELOPER

Systems developers design, build, and develop computer systems. They also test the systems in order to diagnose and fix any faults, as well as to suggest further improvements.

Degree in: computer sciences

Earnings: up to 78 000 €

5 RADIOLOGIST

Radiologists diagnose the disorders or diseases shown in X-rays, ultrasounds, MRIs, and other specialist medical scans which are taken by a radiographer.

Degree in: medicine

Earnings: up to 130 000 €

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ADVANTAGES
of STEM education for children's future

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IN THE EU EMPLOYEES WITH STEM DEGREES HAVE ABOVE AVERAGE EARNINGS AND ARE LESS LIKELY TO BECOME UNEMPLOYED.

Competition for STEM jobs is decreasing

40%

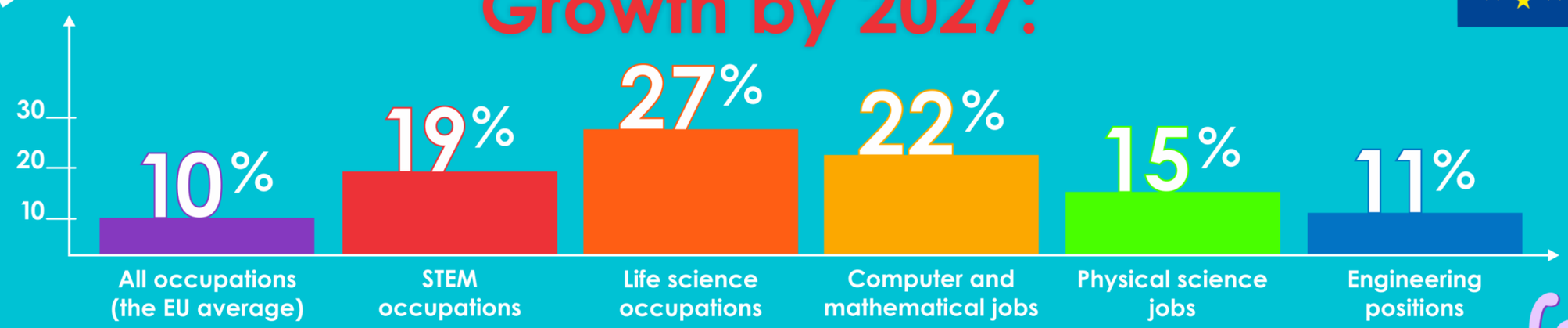
40% of the EU citizens should have STEM degrees to fill current skills' gap, but now we fall 19% behind China, India and Japan.

-19%

EU

CHINA
INDIA
JAPAN

Growth by 2027:



STEM areas to secure a STEM job:

SCIENCE
- chemistry
- biology
- physics

TECHNOLOGY
- tech support
- web developer
- programmer
- game and software developer
- cyber security ...

ENGINEERING
- structural engineer
- hardware engineer
- biomedical engineer
- mechanical engineer ...

MATHEMATICS
- quality control engineer
- statistical programmer
- data analyst ...

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Why you should consider STEM education?

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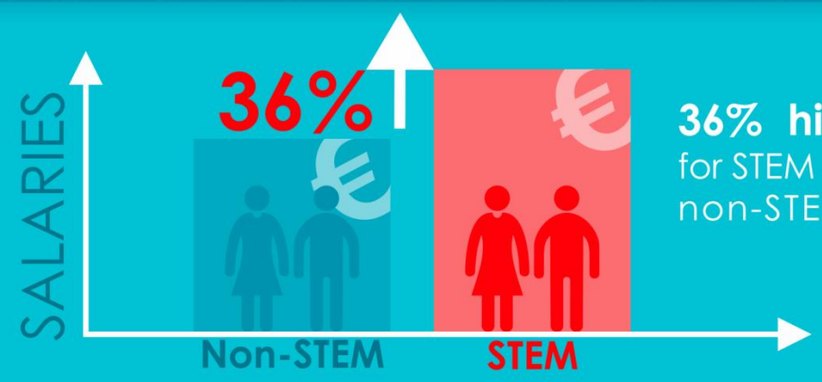
50% of economic growth in the last 50 years was due to technology advancements.



36% higher salaries for STEM employees then non-STEM employees.

STEM degree holders have a **higher income even in non-STEM careers.**

Higher employment chances as **39%** of employers say that there is a lack of available STEM graduates.

1 unemployed for every 1,7 jobs

Non-STEM: 4,1 unemployed for every job

LOW unemployment rates

11% TOTAL UNEMPLOYMENT

2% STEM UNEMPLOYMENT

Roughly 8,2 million STEM job openings are forecasted in the EU by 2025.

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Gender differences in STEM

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17 million

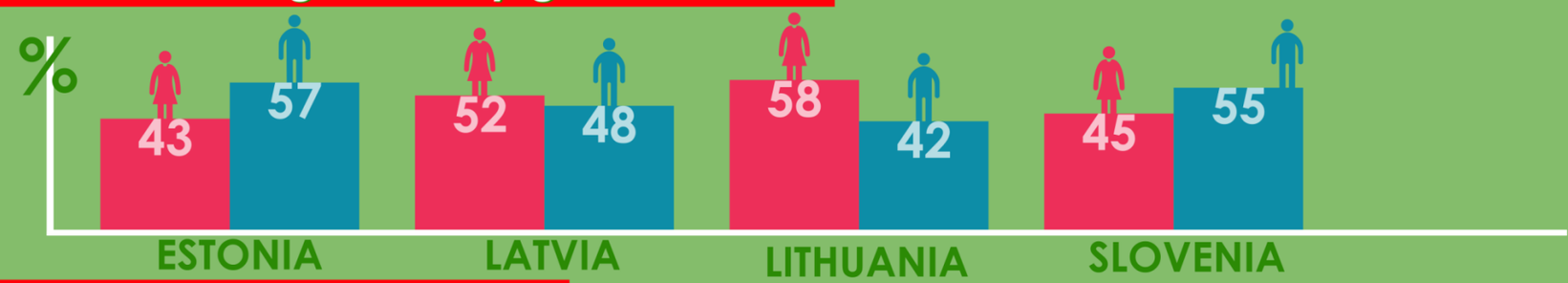
SCIENTISTS AND ENGINEERS IN THE EU

2016

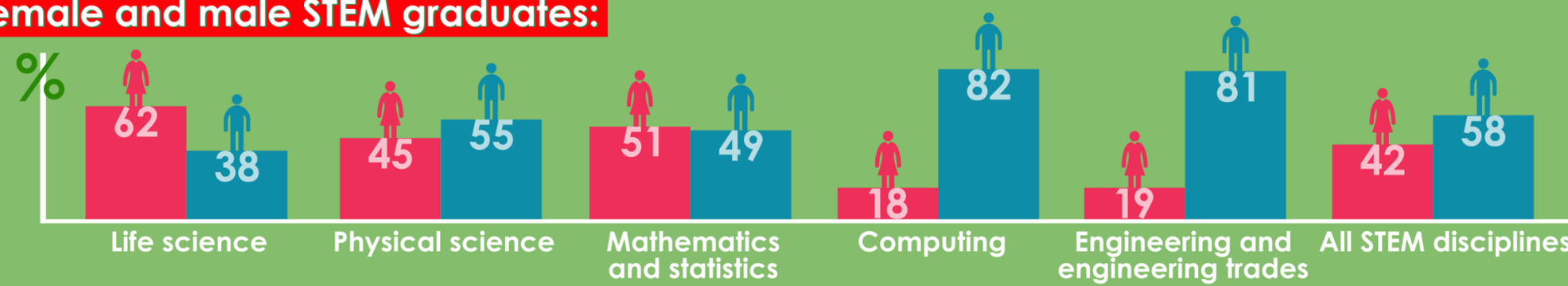
60% MEN 40% WOMEN

(an increase of women of more than 20% since 2007)

Distribution of scientists and engineers by gender, 2016



Share of female and male STEM graduates:



Benefits of equal share of women as men in STEM:

Increase of women share – faster innovation due to a different way of thinking

Gender diversity – higher creativity and productivity

Gender equality – higher GDP

Gap in workers – filling the gap, opportunity for women

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Girls and women in STEM

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2016

ONLY 1 IN 8 JOBS REQUIRING STEM EDUCATION IS TAKEN BY WOMEN

1/10 (9,8%) STEM MANAGERS ARE FEMALE

WOMEN ARE MORE LIKELY TO LEAVE STEM CAREERS

53% OF WOMEN, compared to 31% OF MEN

MOST FEMALES LEAVE STEM CAREER IN THE FIRST 10 YEARS OF STARTING

IN THE EU WOMEN ACCOUNTED FOR 42,2% OF GRADUATES IN THE STEM IN 2015.

Getting more women in STEM starts with enabling girls to get interested in STEM.

Factors influencing girls' interest in STEM

STATISTICALLY IMPORTANT EFFECTS:

- peer group approval
- visible female role models
- practical experience and hands-on exercises
- teacher mentors
- self-perception in STEM subjects compared to boys
- creativity
- real-life application
- support from parents

STATISTICALLY UNIMPORTANT EFFECTS:

- parent careers
- society thinking that STEM is a male area
- STEM examples crafted towards boys' interests

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Girls in STEM

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By 2025: **2,7 million** new STEM jobs / **8,2 million** total STEM jobs

Only **10%** of parents encourage their daughters to try STEM

74%

74% OF HIGH SCHOOL GIRLS are interested in STEM field and subjects.

33%

33% OF UNIVERSITY WOMEN entering STEM degree programmes by graduation switch their studies to a non-STEM field.

25%

25% OF STEM WORKERS are women.

The challenge – girls are losing interest in STEM as they get older.

WHY?

- No real - life female role models are presented to girls.
- STEM subjects at school should be more interesting and hands-on than now.
- STEM concepts taught at school do not provide a clear connection to real life applications.
- Unfamiliar of the impact their work can have on it.

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A four-year STEM window of opportunity

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Girls are 3x less likely than boys wishing to become scientists or engineers.

Only **14%** of girls want to become scientists.

"We need to do more practical experiments so that we can see how things happen in the real world."

13-year old girl, Poland

Most EU girls become attracted to STEM between the age of **11 and 12**.

However, that interest then drops off significantly between the age of **15 and 16**, with a limited recovery.

Only there are **4-5 years** to encourage girls to pursue a STEM degree before they loose their interest for good.

Solutions to engage girls:

- Use new technologies (e.g. virtual worlds, basic coding) to spark girls' interest.
- Availability of STEM after school programmes.
- Gender neutral classes.
- Hands-on experiences in classes.
- Training programs for teachers for collaborative and immersive learning.

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6 teen inventors who are changing the world

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Ann Makosinski
22 years old

HAND POWERED FLASHLIGHT
At the age of 15 she invented flashlight that harvests energy from the heat of your hands.

Elif Bilgin
22 years old

ENVIRONMENTALLY FRIENDLY PLASTICS
At the age of 16 Elif invented how to turn bananas into environmentally friendly plastics.

Eesha Khare
24 years old

FASTEST MOBILE PHONE BATTERY CHARGER
At the age of 17 invented the world's fastest mobile phone battery charger.

Mark Groden
29 years old

UNMANNED HELICOPTER
Mark at the age of 16 built an unmanned aerial vehicle.

Jack Andraka
22 years old

NEW METHOD FOR EARLY SCREENING OF CANCER
Invented method for possibly detecting the early stages of pancreatic and other cancers at the age of 15.

Easton LaChappelle
22 years old

3D PRINTED PROSTHETIC ARM
Easton at the age of 14 invented prosthetic arm that can be 3D printed, including software and design.

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When you see it, you can become it – STEM role models

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There are a huge number of role models who have made a career in one or more STEM subjects.

"It might be that at school you are not seeing the full scope of what you can do in science. You could study maths and end up working in biology."

Sara-Jane Dunn, Scientist, Microsoft Research

Jeff Bezos
Amazon

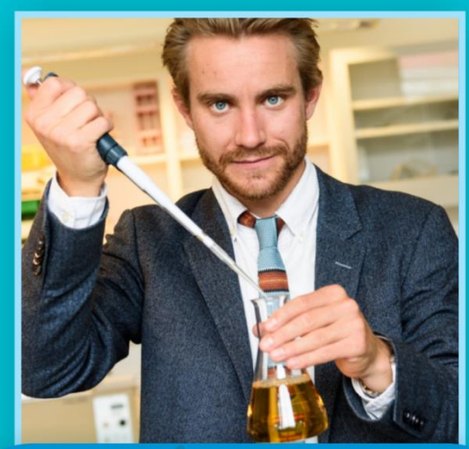
Founder, chairman, CEO, and president of Amazon, currently the world's largest online sales company focusing on e-commerce, cloud computing, and artificial intelligence.

Studied electrical engineering and computer sciences

Nina Marie Tandon
EpiBone

CEO and co-founder of EpiBone, the world's first company growing bones for skeletal reconstruction that cultivates living bone tissue from patients' own cells. This improves bone formation and regeneration, shortens recovery times, eliminating complications of foreign body implantation.

Studied biomedical engineering



Andreas Laustsen
Technical University of Denmark

Specialized in discovery of innovative antivenoms against snakebite to reduce the animal derived antivenoms have on patients. Founder of 3 biotech companies before his 30s: Biosyntia, VenomAb and Antag.

Studied molecular and cellular pharmacology

Sunita Williams
NASA astronaut

US astronaut and navy officer of Indo-Slovenian descent. She formerly held the records for total spacewalks by a woman (seven) and most spacewalk time for a woman (50 hours, 40 minutes).

Studied physical sciences and engineering management

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Successful people with STEM degrees

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Why STEM degree?

"I am proud of seeing my work, ready to use, ready for that next life to save."

Tanya DeSchmidt, Quality Engineer, Philips Automated External Defibrillators

Larry Page
Google

Co-founder of Google, the world's largest multinational online company. It offers services designed for work and productivity (Google Docs), email (Gmail), cloud storage (Google Drive), language translation (Google Translate), mapping and navigation (Google Maps), etc.

Studied engineering and computer engineering

Jennifer Doudna
University of California, Berkeley

Biochemists who discovered and developed CRISPR gene-editing technology. Now considered one of the most significant discoveries in the history of biology. CRISPR can offer treatments for diseases such as cystic fibrosis, Huntington's disease and HIV.

Studied biochemistry

Jawed Karim
YouTube

German-American Internet entrepreneur and co-founder of YouTube. He is the first person to upload a video to the site. This inaugural video – titled Me at the zoo – has been viewed over 60 million times as of January 2019. YouTube was acquired by Google in 2006.

Studied computer sciences

Jane Goodall
Jane Goodall Institute

British ethologist who is considered to be the world's foremost expert on chimpanzees. She is best known for her over 55-year study of social and family interactions of wild chimpanzees since she first went to Gombe Stream National Park, Tanzania.

Studied primatology

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In need of STEM youth

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There is on average only 19% of STEM graduates in the EU every year.

In 2015

Estonia	Latvia	Lithuania	Slovenia
23%	18%	17%	24%

2x more STEM graduates are needed to reach the EU goal of 40% of the EU citizens holding a STEM degree.

Major blameworthy reasons for low popularity of STEM education:

- The way STEM is taught (it needs more hands-on activities than now).
- Little involvement of students, families, teachers and employers in science education
- Students' perception that STEM is difficult.
- Non-accurate information about skills demanded by employers.

How to motivate youth to study STEM:

- An early (at primarily, secondary school) exposure to STEM.
- Additional extra-school activities integration into the curricular (after-school programmes, open days, lectures, workshops, etc.).
- Parents' encouragement to support STEM orientation.
- STEM teaching should include practical activities (laboratory, hands on, experiments).

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STEM extracurricular activities can build children's future

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STEM-focused extracurricular activities (like building robots or joining a math team) can encourage children to explore STEM subjects in a fun, exciting and stress-free way.

WHY IS THAT IMPORTANT?

Demand for STEM skills is growing because jobs related to science, technology, engineering and mathematics are driving now global economic growth.

! 8,2 million STEM jobs in the EU by 2025

+36%

! HIGHER SALARIES for STEM employees

! LESS threat of unemployment

STEM-focused extracurricular activities can:

- help children to determine a field of study at high school and university by discovering their talents and what they like;
- help children to discover something new through trial and error;
- build problem-solving skills;
- provide a safe space for exploration without grading pressure as in classes.

STEM extracurricular activities can help to promote STEM education and give children better employment options.

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Innovation and STEM education are keys to future economic growth

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Countries that lead in STEM education also rank high on innovation.

Without STEM graduates, a country does not innovate or create jobs based on innovation.

Closing the gender gap in STEM will contribute to an increase in the EU GDP per capita by 2.2 to 3.0% by 2050.

Changing just 1% of the workforce into STEM roles would add $57.4 billion to Australia's gross domestic product (GDP).

Closing STEM gap will lead to an improvement in the EU GDP by €610 - €820 billion by 2050.

MAKING SCIENCE AND MATH COURSES FUN AND INTERESTING WILL NOT ONLY HELP STUDENTS TO LEARN, BUT MIGHT ALSO PLANT A "SEED OF INTEREST" THAT COULD GROW INTO AN EXCITING AND REWARDING STEM CAREER POWERING COUNTRY'S ECONOMY.

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