



A Unified Response to Training Needs

Lab Safety in the Age of AI: Evaluating Multimedia Options

October 16, 2024
1:00-2:00PM ET

Agenda

- Introduction
 - *New and relevant OneLab™ Resources*
 - *Today's Presenters*
- Lab Safety in the Age of AI: Evaluating Multimedia Options
- Q&A: Imke Schroeder & Alicia Branch
- Upcoming Events

Participant Rules of Engagement for the Webinar Chat

Please keep the following in mind when using the chat feature:

- **Connect with others!** React to what you're hearing, share experiences, and ask questions of your fellow participants!
- **Have a question for the presenter?** Use the Q&A function, *not* the chat.
- **Show Respect and Professionalism.** Inappropriate language, improper conduct, or any form of discrimination may result in removal from the webinar.
- **Remain on Topic.** Ensure your comments are relevant to the topic.
- **Comply with Moderators' Guidance.** If a moderator gives direction regarding chat behavior, please comply accordingly.
- **Report Issues.** Notify moderators if you experience technical difficulties or observe any disruptive behavior.





IS EXCITED TO
ANNOUNCE

Fundamentals of Public Health Laboratories eLearning Course!

At the end of this hour-long course, learners should be able to:

- Identify the 11 core functions of public health laboratories.
- Explain how the public health laboratory interacts with partners and customers, including other laboratories.
- Describe the role of federal, state, and local agencies and organizations within the public health laboratory system.



[Register now on OneLab REACH™](#)

Division of Laboratory Systems

October 2024

Biosafety & Biosecurity Month

Check out our *Featured Initiatives*:

- ECHO Biosafety Program
- Raising Awareness of ISO 35001:2019
- CLIAC Biosafety Workgroup



[Safe Labs | CDC](#)



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Presentation content from external panelists may not necessarily reflect CDC's official position on the topic(s) covered.

Today's Presenter



Imke Schroeder, PhD

Research Project Manager

University of California, Los Angeles (UCLA)

University of California Center for Laboratory Safety



A Unified Response to Training Needs

Lab Safety in the Age of AI: Evaluating Multimedia Options

Dr. Imke Schroeder

October 16, 2024

Overview

Artificial Intelligence and its limitations

Applications of different large language models

Comparison of visual tools

Artificial voiceover tools

Comparison of presentation tools



Learning Objectives

At the end of this presentation, you should be able to:

- Differentiate between generative AI and machine learning
- Recognize the usefulness and limitations of large language models
- Evaluate different large language models for different work needs
- Apply AI tools to create images and presentations



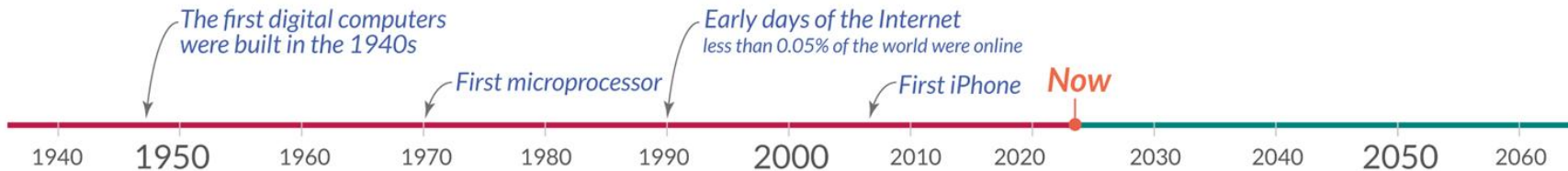
Poll

Are you using AI tools for your work?





How did we get here?



Claude Shannon, 1948
Inventor of “bits”



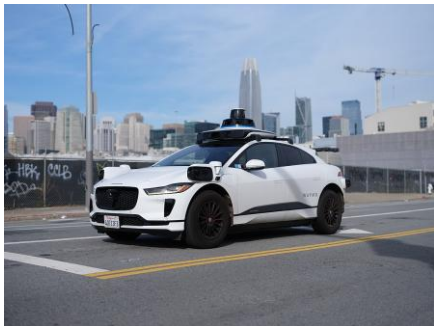
OpenAI released
ChatGPT, Nov 2022



Nobel Prizes in Physics
Chemistry for AI invention
and applications 2024



AI: What is the difference?



Wiki Image

Computers create new, original content such as text, images, music, audio, and video.

Generative
AI

Machine
Learning

Natural
Language
Processing

Uses algorithms and statistical models, computers learn from and make decisions based on data without explicit instructions.

Enables computers to interpret, manipulate, and comprehend human language.

Types of Chatbots



- **ChatGPT - OpenAI.com**
- **Claude - Anthropic**
- **Perplexity - Aravind Srinivas**
- **Copilot - Bing**
- **HARPA - Chrome Extension**
- **Gemini - Google**



No internet connection



Chatbot Limitations



- Security risks especially when dealing with sensitive information
- Ethical considerations related to privacy, transparency, and user behavior
- Prone to bias from its training data sets
- Can hallucinate facts and give plausible but incorrect answers due to its training on limited data. Requires human oversight




Thus, check and edit the content created by a chatbot!

Poll

Does your institution have a policy for AI use?



Do not use AI tools for:

-  Applications containing sensitive data (medical records, student records, research data, intellectual property)
-  Questionable ethical application (generate academic content, admissions/hiring processes, counseling where human empathy and judgment are required)
-  Formulating confidential communications

What should you do if your institution does not have a policy for AI use?

Potential AI Applications

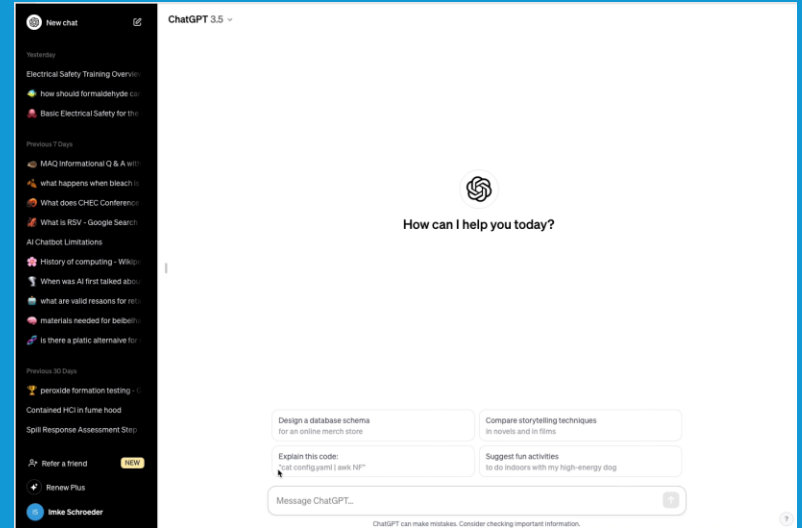
- ➔ Training development
- ➔ Creating a safety manual
- ➔ Summarizing an existing policy
- ➔ Improving language
- ➔ Summarize key points of a video
- ➔ Summarizing data in an excel sheet
- ➔ Formulating a justification
- ➔ Writing an email
- ➔ Etc



How much energy is consumed by AI computing?



Let's ask ChatGPT



How much energy is consumed by AI computing?



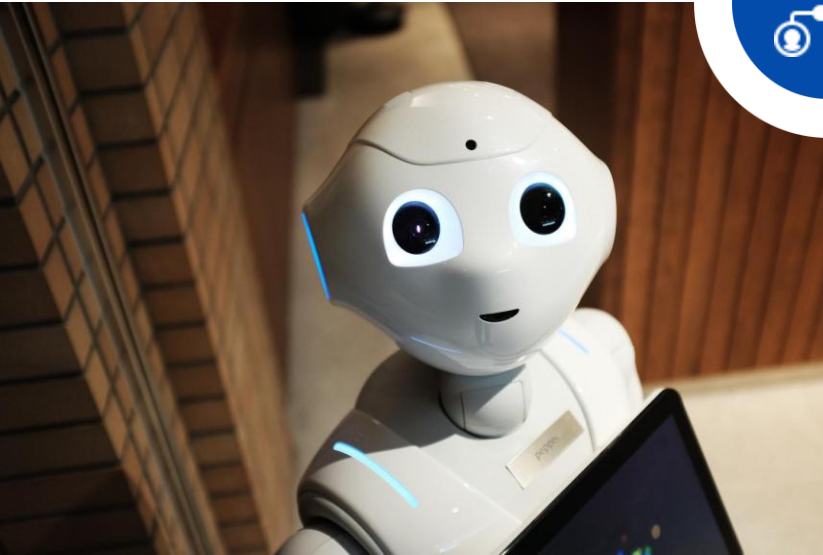
Claude:

The energy consumption of AI servers could range from 85 to 134 terawatt hours annually by 2027, which is comparable to the electricity usage of an entire country like Argentina, Sweden, Netherlands

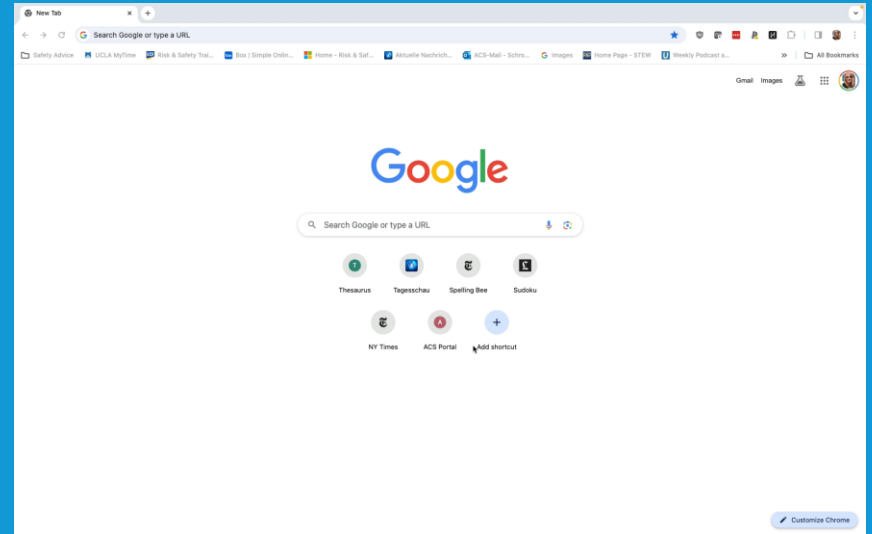
AI tool usage has to become sustainable!



Explain Einstein's theory of relativity



Let's do a google search first and then use HARPA



Text Translation



Can you translate this text into Spanish?

¡Claro! Imagina que tienes una nave espacial súper genial y estás viajando por el espacio a toda velocidad. Ahora, Albert Einstein, un científico muy inteligente, pensó en lo que sucede cuando las cosas van muy, muy rápido o cuando la gravedad es muy fuerte, como en un planeta gigante. Se le ocurrieron dos ideas llamadas la teoría especial de la relatividad y la teoría general de la relatividad

Improve Language



Original

If your institution allows it and you have been trained, you may de-energize and isolate anything that is on fire and use a fire extinguisher with a Type C label, which is non-conductive.

Claude

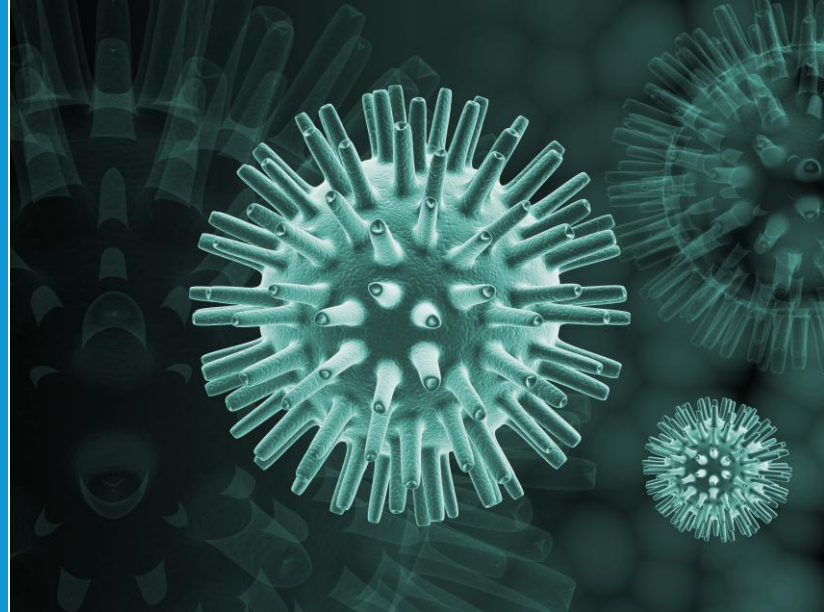
In the event of an electrical fire, follow these steps if you are properly trained and authorized by your institution:

1. De-energize the affected equipment by safely cutting off the power supply.
2. Isolate the area to prevent the fire from spreading.
3. Use a fire extinguisher specifically labeled as Type C, which is designed for electrical fires and contains non-conductive extinguishing agents.

Create Content

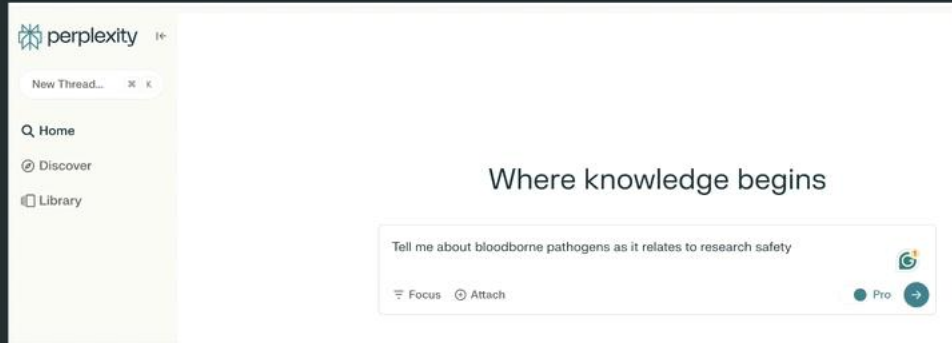
“Tell me about bloodborne pathogens as they relate to research safety”

"Create an outline for a 15-min interactive eLearning course for researchers. Include information contained in these 2 attachments”

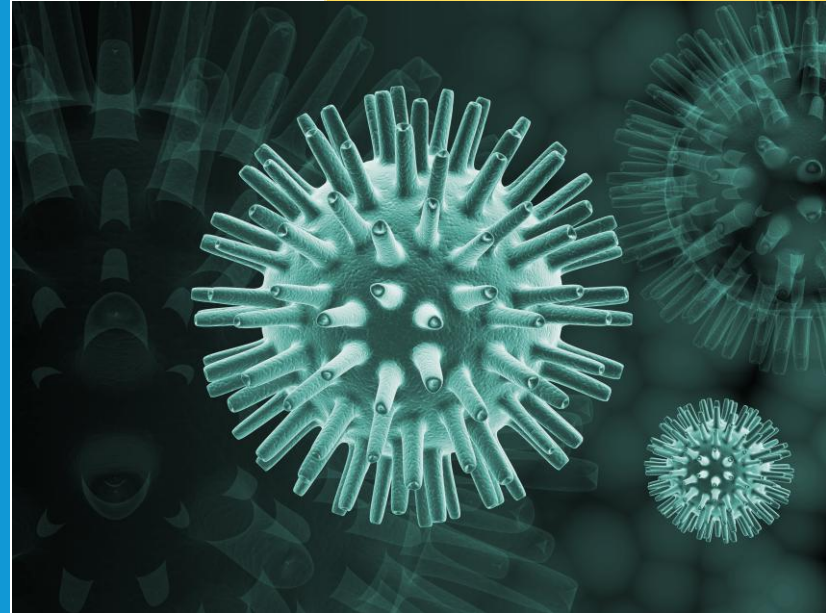


Create Content

Bloodborne Pathogen: Let's ask Perplexity



The screenshot displays the Perplexity AI web interface. On the left, there is a navigation sidebar with the Perplexity logo and menu items: "New Thread...", "Home", "Discover", and "Library". The main content area features the heading "Where knowledge begins" and a search input field containing the text "Tell me about bloodborne pathogens as it relates to research safety". Below the input field are icons for "Focus", "Attach", "Pro", and a search button.



Create Content

"Create an outline for a 15-min interactive eLearning course for researchers. Include information contained in these 2 attachments"

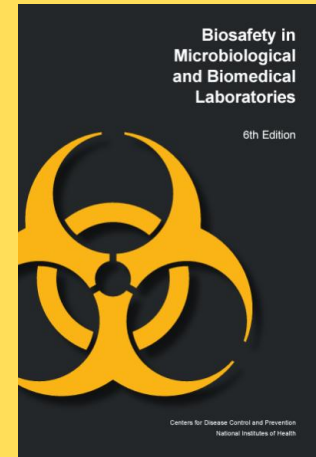


Where knowledge begins

Create an outline for a 20-minute interactive eLearning course on Bloodborne Pathogens for scientists in research labs. Base the information on the content in these 2 attachments that is relevant to bloodborne pathogens.

✍ Writing ▾ 📎 Attach

● Pro ➕



Refined content and flushed out the introduction

Make the outline only specific to bloodborne pathogens

🔍 Pro Search

5 steps completed ▾

☰ Sources

OSHA BloodBorne Pathogens_Training.pdf
File - 1

Bloodborne Pathogens - Overview
osha - 2

Research involving Human Cell Lines
princeton - 3



View 22 more

☰ Answer

Based on the sources provided and your request to focus specifically on bloodborne pathogens for student researchers, here is an outline for a 15-minute eLearning course:

Introduction (2 minutes)

- Definition of bloodborne pathogens
- Examples (HBV, HCV, HIV)
- Risks of exposure when working with human cell lines

Routes of Exposure (3 minutes)

- Percutaneous injuries (needlesticks, broken glass)
- Mucous membrane contact
- Non-intact skin exposure

Conducting a Risk Assessment (3 minutes)

- Identifying hazards
- Evaluating risk
- Selecting appropriate controls and work practices

Introduction (4 minutes)

What are bloodborne pathogens?

- Definition: Microorganisms such as viruses and bacteria that are carried in blood and can cause disease
- Examples: Hepatitis B virus (HBV), Hepatitis C virus (HCV), and Human Immunodeficiency Virus (HIV)

Why are bloodborne pathogens a concern for students working in labs?

- Potential exposure through contact with infected human blood, tissues, or cell lines
- Lack of characterization of cell lines obtained from secondary sources
- Latent viruses can be reactivated from infected human cell lines

Occupational Safety and Health Administration (OSHA) Bloodborne Pathogens Standard

- Applies to workers with potential occupational exposure to bloodborne pathogens
- Includes requirements for exposure control plan, personal protective equipment, training

Effects of bloodborne pathogen exposure

- Infections such as viral hepatitis and HIV
- Long-term health consequences

This introduction covers the key points about why bloodborne pathogens are a safety concern for the target audience of students working with human fluids and cell cultures in the lab. It defines what bloodborne pathogens are, highlights routes of potential exposure, and overviews applicable OSHA regulations and effects of exposure.

🔗 Share 🔄 Rewrite

🗑️ ✎️ ⋮ CLAUDE-2.1

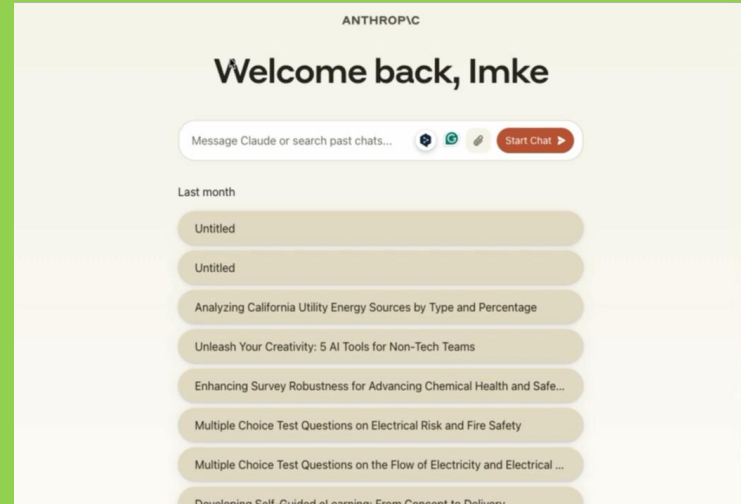
Perplexity

Create test questions for a bloodborne pathogen training course



“Write 3 multiple-choice test questions for the introduction and give feedback on the correct answer”

Let's use Claude



Using AI to create content from a video



Perplexity



<https://www.youtube.com/watch?v=fveJ-IUCzrg>





Why Copilot?

It's powerful and protective

Powerful AI models



Copilot uses GPT-4 for text and DALL-E 3 for images, the advanced AI models

Transparent about sources



Copilot cites the data sources behind its answers

No knowledge cutoff



Copilot provides up-to-date answers. Answers are not limited by the date of the AI model

Commercial data protection



Copilot doesn't save prompts or answers, nor use them to train the AI model






UCLA

Protect our data – Use Copilot for your AI Chat

Copilot is our official AI chat because it keeps our data safe

Copilot protects in this way:

- Work account**

Bing treats your content appropriately through Copilot. Data Loss Prevention protections are respected by Copilot when using the Microsoft Edge browser
- No human eyes**

After signing in, data is encrypted and is not seen by humans
- Discarded**

Prompts and answers are discarded at the end of a session. Data is not used to train AI models

Data from the World Happiness Report 2023

	B	C	D	E	F	G	H	I	J
y	region	happiness_score	gdp_per_cap	social_supp	healthy_life	freedom_to	generosity	perceptions_of_corruption	
Ireland	Western Europe	7.587	1.39651	1.34951	0.94143	0.66557	0.29678	0.41978	
Denmark	Western Europe	7.561	1.30232	1.40223	0.94784	0.62877	0.4363	0.14145	
United Kingdom	Western Europe	7.527	1.32548	1.36058	0.87464	0.64938	0.34139	0.48357	
Netherlands	Western Europe	7.522	1.459	1.33095	0.88521	0.66973	0.34699	0.36503	
Canada	North America	7.427	1.32629	1.32261	0.90563	0.63297	0.45811	0.32957	
Iceland	Western Europe	7.406	1.29025	1.31826	0.88911	0.64169	0.23351	0.41372	
Switzerland	Western Europe	7.378	1.32944	1.28017	0.89284	0.61576	0.4761	0.31814	
Norway	Western Europe	7.364	1.33171	1.28907	0.91087	0.6598	0.36262	0.43844	
New Zealand	North America	7.286	1.25018	1.31967	0.90837	0.63938	0.47501	0.42922	
Australia	North America	7.284	1.33358	1.30923	0.93156	0.65124	0.43562	0.35637	
Israel	Middle East and North Africa	7.278	1.22857	1.22393	0.91387	0.41319	0.33172	0.07785	
Costa Rica	Latin America and the Caribbean	7.226	0.95578	1.23788	0.86027	0.63376	0.25497	0.10583	
Spain	Western Europe	7.2	1.33723	1.29704	0.89042	0.62433	0.33088	0.18676	
Chile	Latin America and the Caribbean	7.187	1.02054	0.91451	0.81444	0.48181	0.14074	0.21312	
United States	North America	7.119	1.39451	1.24711	0.86179	0.54604	0.40105	0.1589	
Uruguay	Latin America and the Caribbean	6.983	0.98124	1.23287	0.69702	0.49049	0.14574	0.17521	
Belgium	Western Europe	6.946	1.56391	1.21963	0.91894	0.61583	0.28034	0.37798	
Italy	Western Europe	6.94	1.33596	1.36948	0.89533	0.61777	0.45901	0.28703	
France	Western Europe	6.937	1.30782	1.28566	0.89667	0.5845	0.2225	0.2254	
United Arab Emirates	Middle East and North Africa	6.901	1.42727	1.12575	0.80925	0.64157	0.26428	0.38583	
Sweden	Western Europe	6.867	1.26637	1.28548	0.90943	0.59625	0.51912	0.32067	
Qatar	Middle East and North Africa	6.853	1.36011	1.08182	0.76276	0.63274	0.21542	0.32524	
Venezuela	Latin America and the Caribbean	6.81	1.04424	1.25596	0.72052	0.42908	0.05841	0.11069	
Thailand	Southeast Asia	6.798	1.52186	1.02	1.02525	0.54252	0.31105	0.4921	
Colombia	Latin America and the Caribbean	6.786	1.06353	1.1985	0.79661	0.5421	0.24434	0.0927	
Germany	Western Europe	6.75	1.32792	1.29937	0.89186	0.61477	0.28214	0.21843	

Analyze
Data
from an
Excel file

Let's use Copilot

Analyze Data from an Excel file - Copilot

	B	C	D	E	F	G	H	I	J
country	region	happiness_score	gdp_per_capita	social_support	healthy_life_expectancy	freedom_to_make_life_choices	generosity	perceptions_of_corruption	
Ireland	Western Europe	7.587	1.39651	1.34951	0.94143	0.66557	0.29678	0.41978	
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Japan	Western Europe	6.94	1.33596	1.36948	0.89533	0.61777	0.45901	0.28703	
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Portugal	Latin America and Caribbean	6.67	1.10715	1.12447	0.85857	0.44132	0.33363	0.12869	
Canada	Middle East and North Africa	6.611	1.69042	1.0786	0.79733	0.6404	0.32573	0.52208	
United States	Western Europe	6.575	1.27778	1.26038	0.94579	0.55011	0.12332	0.20646	
China	Latin America and Caribbean	6.574	1.05351	1.24823	0.78723	0.44974	0.11451	0.08484	
Reputation	Central and Eastern Europe	6.505	1.17898	1.20643	0.84483	0.46364	0.10686	0.02652	
India	Latin America and Caribbean	6.485	1.06166	1.2089	0.8116	0.60362	0.2324	0.24558	

Copilot
Analyze the data: country\reg...

You

Analyze the data: country region happiness_score gdp_per_capita social_support healthy_life_expectancy freedom_to_make_life_choices generosity perceptions_of_corruption

Switzerland Western Europe 7.587 1.39651 1.34951 0.94143 0.66557 0.29678 0.41978

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United Kingdom Western Europe 6.867 1.26637 1.28548 0.90943 0.59625 0.51912 0.32067

Analyze Data from an Excel file - Copilot



Copilot

Let's analyze the data you provided. Here are some key insights:

Top 5 Happiest Countries

1. **Switzerland:** Happiness Score - 7.587
2. **Iceland:** Happiness Score - 7.561
3. **Denmark:** Happiness Score - 7.527
4. **Norway:** Happiness Score - 7.522
5. **Canada:** Happiness Score - 7.427

Key Factors Contributing to Happiness

- **GDP per Capita:** Higher GDP per capita generally correlates with higher happiness scores. For example, Luxembourg has the highest GDP per capita (1.56391) and a relatively high happiness score (6.946).
- **Social Support:** Countries with strong social support systems, like Iceland (1.40223) and Denmark (1.36058), tend to have higher happiness scores.
- **Healthy Life Expectancy:** Higher life expectancy is another significant factor. For instance, Singapore has a high healthy life expectancy (1.02525) and a happiness score of 6.798.
- **Freedom to Make Life Choices:** Countries where people feel they have more freedom to make life choices, like Finland (0.64169) and New Zealand (0.63938), also score higher in happiness.
- **Generosity and Perceptions of Corruption:** While these factors vary, countries with higher generosity and lower perceptions of corruption tend to have higher happiness scores. For example, Denmark has a high generosity score (0.34139) and a low perception of corruption (0.48357).

Perplexity

Economic Factors

There's a strong correlation between GDP per capita and happiness scores. Countries like Luxembourg (1.56391), Singapore (1.52186), and Norway (1.459) have high GDP per capita scores and rank highly in overall happiness ^{1D}.

However, some countries like Costa Rica (7.226) achieve high happiness scores with relatively lower GDP per capita (0.95578), suggesting other factors play significant roles



Analyze Data from an Excel file - Copilot

Regional Insights

- **Western Europe:** Dominates the top of the happiness rankings with countries like Switzerland, Iceland, Denmark, and Norway.
- **North America and ANZ:** Canada, New Zealand, and Australia also rank high in happiness.
- **Middle East and North Africa:** Countries like Israel and the UAE show high happiness scores.
- **Latin America and Caribbean:** Costa Rica and Mexico are among the top performers in the region.

Notable Observations

- **Luxembourg:** Despite having the highest GDP per capita, its happiness score is lower than many European countries.
- **Singapore:** High GDP per capita and healthy life expectancy but lower happiness score compared to European countries.
- **United States:** High GDP per capita but lower happiness score compared to many European countries due to high levels of corruption.

If you have any specific questions or need further analysis, feel free to

Perplexity

Outliers and Interesting Cases

Some countries achieve relatively high happiness scores despite lower economic indicators:

- Costa Rica ranks 12th in happiness despite a much lower GDP per capita than many Western countries ¹⁰.
- Thailand ranks relatively high (34th) and has the highest generosity score (0.5763) in the dataset ¹⁰.

Conversely, some wealthy countries rank lower than might be expected based on GDP alone:

- Japan ranks 46th despite high scores in GDP per capita and healthy life expectancy ¹⁰.
- Kuwait has a high GDP per capita score but ranks 39th in overall happiness ¹⁰.

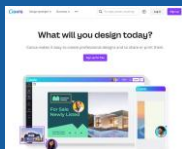


OneLab™

Create Custom Images



Adobe Firefly



Canva

DALL·E 2

DALL·E 2 is an AI system that can create realistic images and art from a description in natural language.

Dall-E 2



Midjourney



Alisha Klatt





OneLab™

AI Art Example: Adobe Firefly



April 2023



July 2024

Prompt: smiling scientists in buttoned-up laboratory coats, wearing safety glasses, wearing nitrile gloves, standing by an empty laboratory bench in a modern laboratory, natural lighting, photorealistic



OneLab™

AI Art Example: Canva



April 2023



July 2024

Prompt: smiling scientists in buttoned-up laboratory coats, wearing safety glasses, wearing nitrile gloves, standing by an empty laboratory bench in a modern laboratory, natural lighting, photorealistic



OneLab™

AI Art Example: Canva (different prompt)



April 2023



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AI Art Example: DALL-E 2



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AI Art Example: Midjourney



April 2023



July 2024

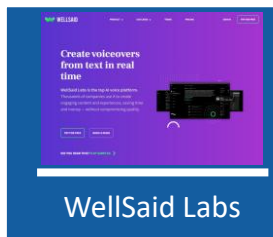
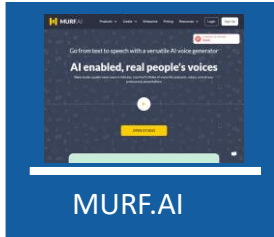
Prompt: smiling scientists in buttoned-up laboratory coats, wearing safety glasses, wearing nitrile gloves, standing by an empty laboratory bench in a modern laboratory, natural lighting, photorealistic

Image Limitations



- Problems with rendering hands
- Incorrect PPE (lab coat not closed, safety glasses, etc.)
- Biases
- Read user rights carefully

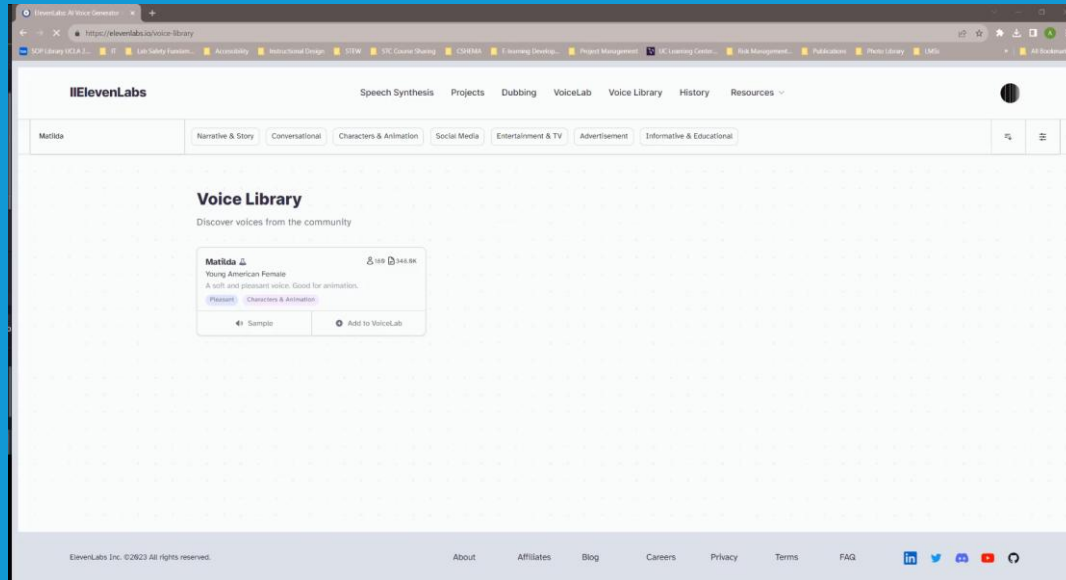
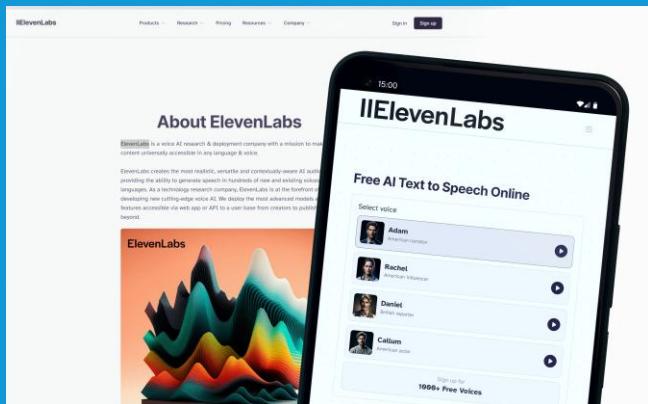
Auto-Generate Narration





OneLab™

AI Voiceover: ElevenLabs



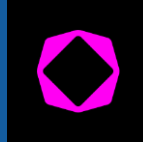
Build and Improve Presentations



PowerPoint AI*



Slides AI



TOME

*With Microsoft
365 subscription
via web browser:
microsoft365.com





Introduction to Laboratory Safety

- Definition of laboratory safety
- Key safety rules and regulations
- Proper handling and disposal of hazardous materials
- Importance of communication in a laboratory setting
- Safety equipment and their uses





Storage

Proper storage is essential to maintain a safe laboratory environment. Chemicals should be stored in designated areas that are clearly labeled with the chemical name, hazard warnings, and expiration date. Flammable chemicals should be stored in flammable storage cabinets, and corrosive chemicals should be stored in acid-resistant cabinets. Incompatible chemicals should be stored separately to prevent accidental mixing.

In addition to chemicals, equipment and materials should also be stored properly. Glassware should be stored on sturdy shelves or in racks to prevent breakage. Electrical equipment should be stored in dry areas away from water sources. Finally, it is important to regularly inspect storage areas for leaks, spills, and other hazards.





AI for Presentations Demonstration 11-16-23

Search (Alt + O)

Your Rehearsal Report (Preview)

Rehearse Again

Rehearse for more than one minute for Coach to better understand your speech and give recommendations.

Summary

Good job rehearsing! Keep up the hard work.

0:19 total time spent **1** slides rehearsed

Fillers

✓ Fantastic! You didn't say too many filler words in your speech!

[Learn More](#)

Repetitive Language

Pace

100 150

slow 139 words/min fast

Your pace is just right! Keep it up!

Your average pace over time

words/min

Time	Pace (words/min)
Start	50
End	139

Designer

AI Tools Can:

- Create custom theme designs
- Suggest changes
- Provide language options
- Offer performance feedback

Summary

Use Chatbots to:

- Increase your knowledge
- Create content
- Summarize existing content
- Translate into a different language
- Choose chatbots that work for you

BUT, be aware of their limitations

Verify the
content

- Lab-related AI images still need - improvements
- AI voiceovers are user-friendly
- Presentation AIs can save time and can make a presentation more interesting



**Thank You
Alisha Klatt!**



Thank you



Lab of Horrors

pop playful spooky

[Verse]

Ebola in a test tube glowing neon green
Salmonella creeping like it's Halloween
Rats with tiny lab coats running wild at
night

CRISPR/Cas is casting spells with genetic

SUNO

Imke Schroeder, UCLA

ischroeder@ehs.ucla.edu



Questions?



After participating in today's session, to receive continuing education credits you must:

1. Log into your [OneLab REACH account](#). You must be logged into your REACH account to access the evaluation.
2. Click on [Lab Safety in the Age of AI Course](#) to take you to the survey.
3. Enter passcode "1LN7"
4. Click "Enroll"

Live Event Course

OneLab Network

Lab Safety in the Age of AI: Evaluating Multimedia Options

CE 1.0 Hours P.A.C.E.® credit

Category Workforce Development

Duration 1 Hour

P.A.C.E.® Certificate Number 288-307-24

Enroll

5. Select "Start Course".

OneLab REACH™

My Learner Hub Training Job Aids & Resources

Cancel Start Course

6. Select "Start".

Live Event Course

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Start

7. Select "Next step" and "Next".

Course Training Progress 50%

Congratulations! Select the "Next step" to earn P.A.C.E credit, and receive your certificate

Next step

BACK NEXT

8. Complete the evaluation and click "Submit". Receive your P.A.C.E.® certificate in your [MyLearnerHub](#).

Thank you for completing this OneLab event survey. If you have any questions, please contact onelab@cdc.gov.

< Previous Submit

Upcoming Event!

[Register
Here!](#)



OneLab
TEST

REGISTER FOR THE
WEBINAR



“Ready? Set? Test!”

Patient Testing Is Important.
Get the Right Results. Session 2

October 23, 2024 12-1 PM ET

Click the link to **register** for the event

Upcoming Event!

*Register
Here!*



OneLab
Network

REGISTER FOR THE
WEBINAR

**Something Is Strange – Let's Notify
the Laboratory Response Network
(LRN)**

November 19th, 2024
12:00 PM – 1:00 PM ET



OneLab **Assessments**

Share your feedback and laboratory training needs with us!

Email OneLab@CDC.gov