



Scientific Research A Stimulating Voyage

Marwa Ahmed and Khaled Alashmouny



Webinar I – ES Series on Scientific Research

Who are Egypt Scholars?

Awareness



Professional Development



Social Responsibility



عَامِّ مُصْرَّاعٌ

An Ecosystem where every mind makes a difference



Interactive Webinars



Studying abroad and Scholarships

Mentorship



Why are you here?



I CAN & I WILL



What I can promise you

CHANGE

DIFFERENT

MOTIVATED

FUN

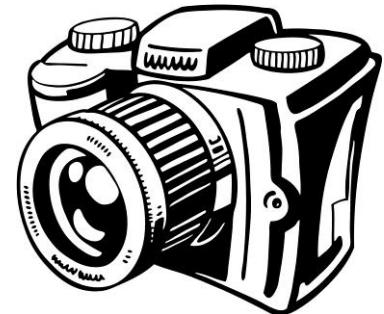
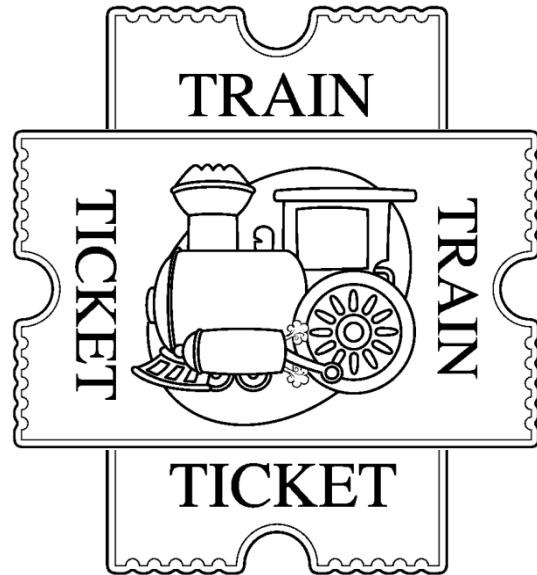
REFLECT

DETERMINED

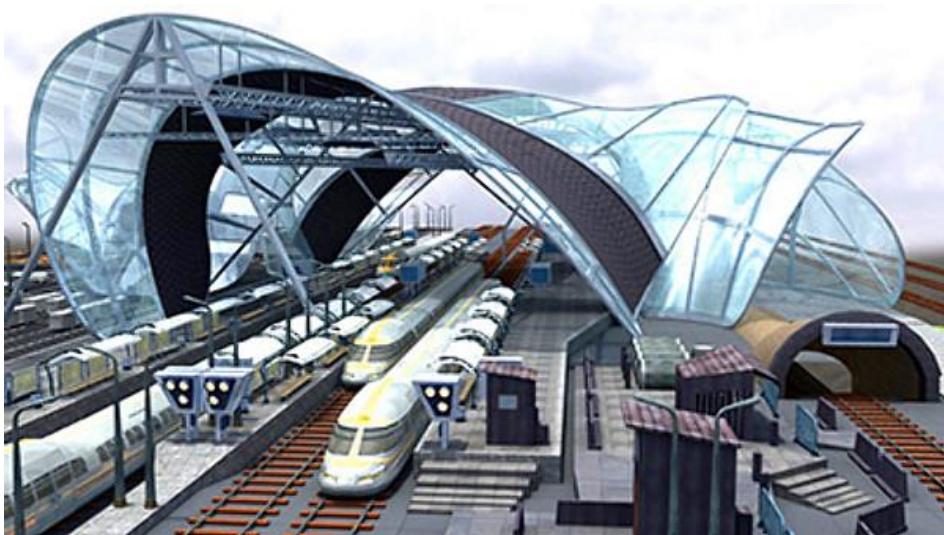
HOPE



Are you ready for the ride?



A Stimulating Voyage



The Program

Station 1: the essence

Station 2: past – present - future

Station 3: 10 things you should know

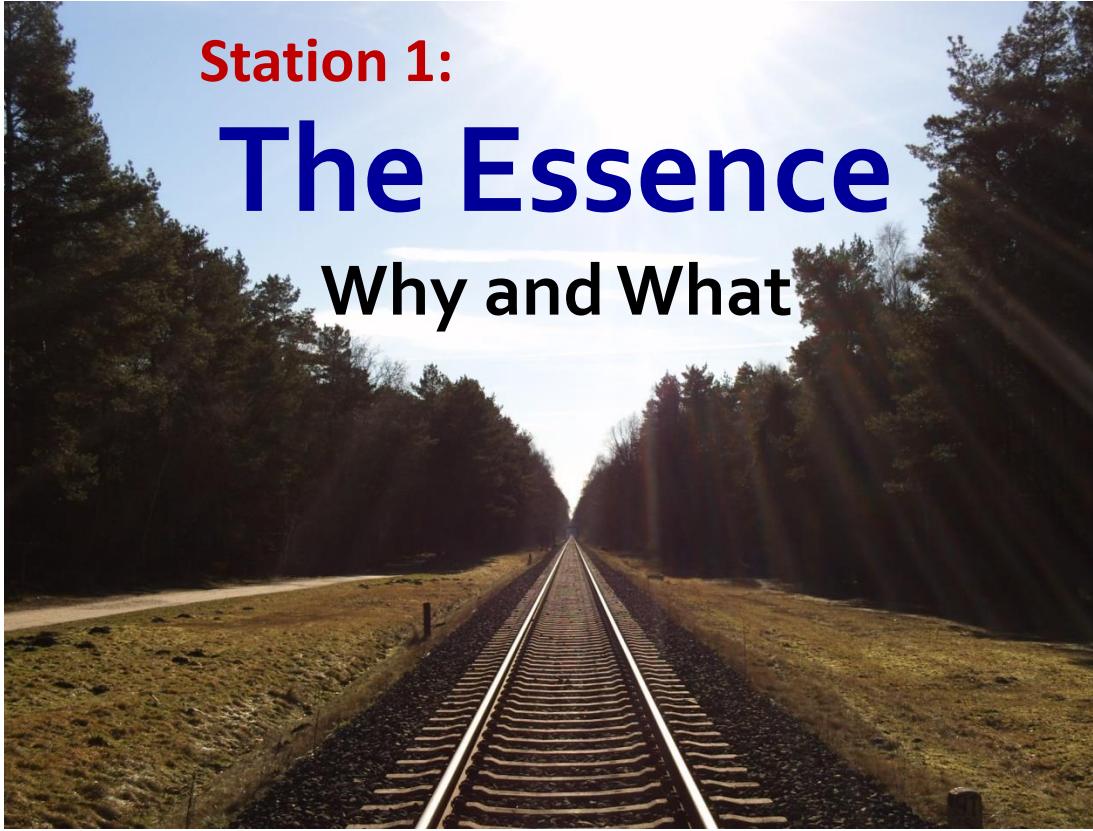
Station 4: 10 things you should do

Station 5: the journey shop

Station 1:

The Essence

Why and What



As a researcher you seek answers to questions of great interest to you.



The research process deals with the ways and strategies used by researchers to understand the world around us



What is Scientific Research?

Claim + Evidence + Reasoning → Explanation



phenomenon



questions



observation



experiments



Probable-Absolute

May lead to rejection of an old idea or belief

Questions (A)

1. Do you see any limitations in this method?
2. Is it the only method to do research?



Answer in the course group

Yes, it is very **important**

- **We are curious**
- **We strive for improvements**
- **We believe we are on Earth to build and change**
- **We like innovation and opening new directions**



Reflect - Renew - Revolve

- It leads to a renewed and sometimes transformed understanding of our own nature and our place and role in the cosmos.



Construct – Collaborate - Combine

- It units people from all over the world together for the best of humanity



Yes, it is effective

- Quality of life
- Technology
- Commerce and economy
- Medicine and healthcare
- Arts



Quality of life



Media – the world is a small village



Yes, it is multidisciplinary

- Medicine and Engineering
- Engineering and Business
- Science and Medicine
- Psychology and Politics
- Arts and Biomimetic



And what else?

- Building strong nations: intellectual and economical
- Sustainability and Independence
- Building and sustaining the Earth
- Guiding people and enlighten them
- Envisioning the future
- Innovating and working in advanced technology



Questions (B)

1. What should you as an individual care about?
2. What should we care about as a society?
3. What is your role?



Answer in the course group



Station 1 reached ... moving to station 2

Station 2: Past



Present

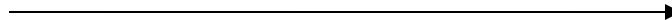


Future



A fascinating history

- The development of the scientific method involves some of the most enlightened cultures in history



- It is the one unique thing that shows you how humans add to each others

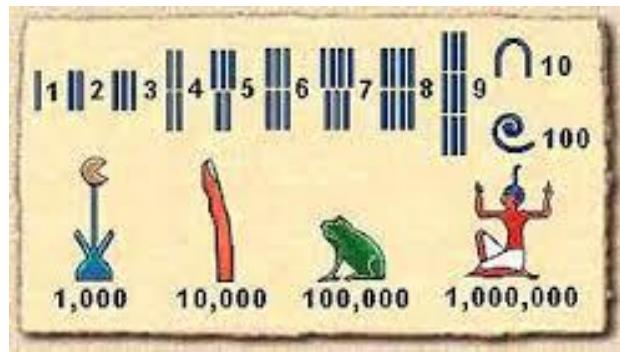
Ancient Egypt

Just as life arose from the waters, the seeds of civilization were first sown along the banks of the Nile

6000 B.C. —————→ 332 B.C.



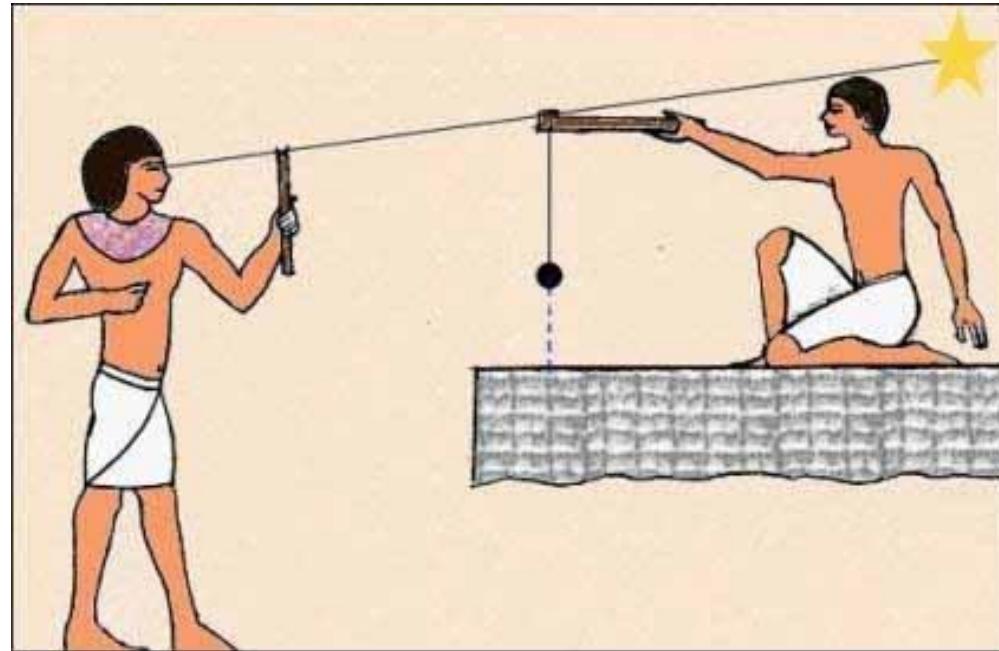
- The mathematical skill of the Egyptians was focused upon solving real world problems



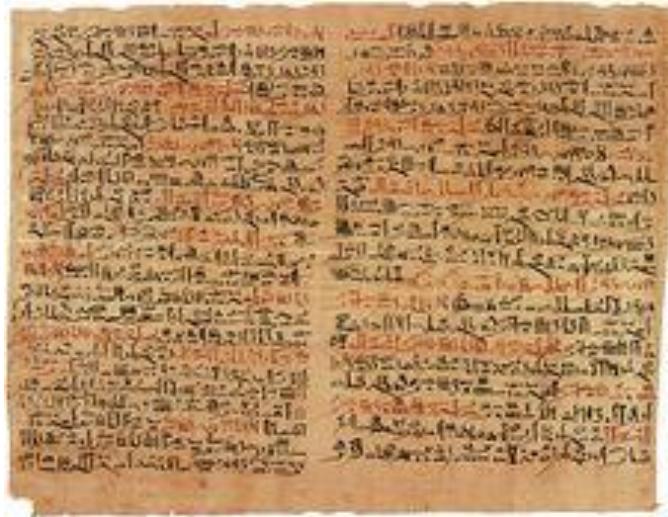
- The annual flooding of the Nile was the driving force behind the development of Egyptian astronomy



Stellar clock



- Due to the hot and dry climate in Egypt, ancient papyri have survived intact, allowing historians to study the sophisticated techniques employed by Ancient Egyptian physician

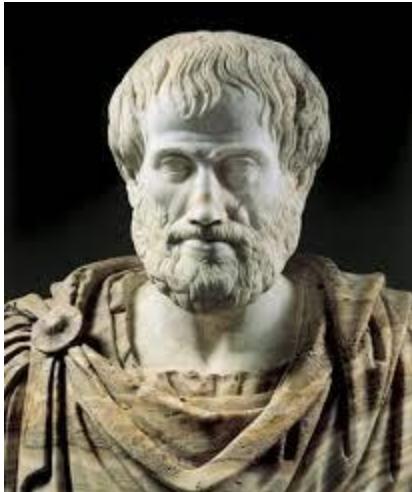


Ancient Greece

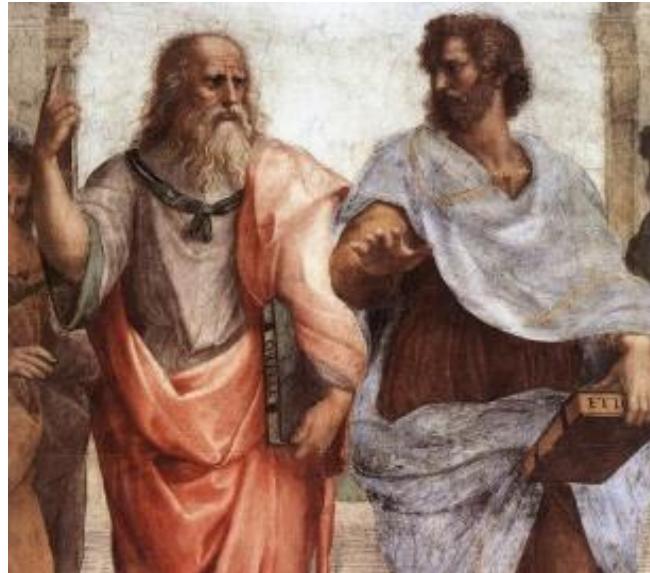
Whilst Babylonian, Indian and Egyptian scholars developed some empirical ideas, the Greeks were the first to develop what we recognize as the scientific method.



Measurement and observation, the foundations upon which science is built, were Aristotle's contribution



'Plato is dear to me, but dearer still is truth'



Plato

Philosophy

Aristotle

Brain

Testing?

The Muslims Influence on the History of the Scientific Method

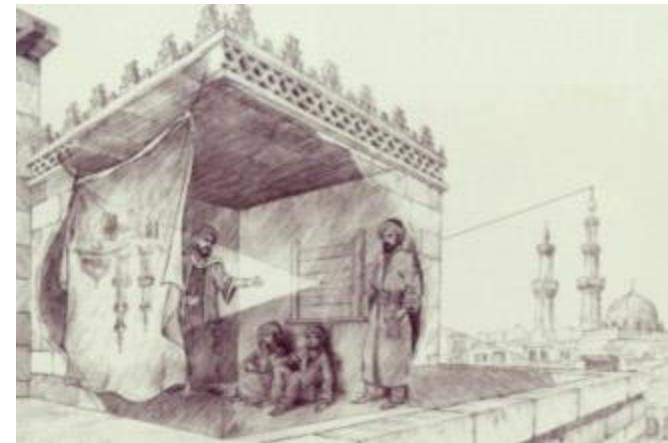
600 AD

1600 AD



Experimental

"إن الباحث عن الحقيقة ليس هو من يدرس كتابات القدماء، على حالتها ويضع ثقته فيها، بل هو من يُعلّق إيمانه بهم ويتتسائل ما الذي جناه منهم. هو الذي يبحث عن الحجة، ولا يعتمد على أقوال إنسان طبيعته يملأها كل أنواع النقص والقصور. وبالتالي فإن من الواجب على من يحقق في كتابات العلماء، إذا كان البحث عن الحقيقة هدفه، هو أن يستنكر جميع ما يقرأه، ويستخدم عقله حتى النخاع لبحث تلك الأفكار من كل جانب. وعليه أن يتشكك في نتائج دراسته أيضاً، حتى يتتجنب الوقوع في أي تحيز أو تساهل"

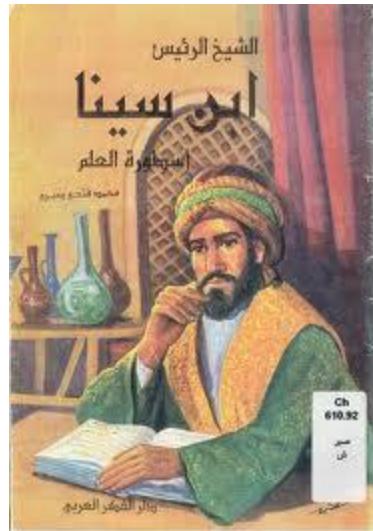


Ibn al-Haytham the first "true scientist"

Al-Biruni's methods resembled the modern scientific method, particularly in his emphasis on **repeated experimentation**. He understood that measuring instruments and human observers were prone to error and bias, so proposed that experiments needed replications



Ibn Sina (Avicenna), one of the titans in the history of science



The renaissance (12th century) was another turning point for the scientific method, where European scholars took the knowledge of the Greeks and the Muslims, and added to it

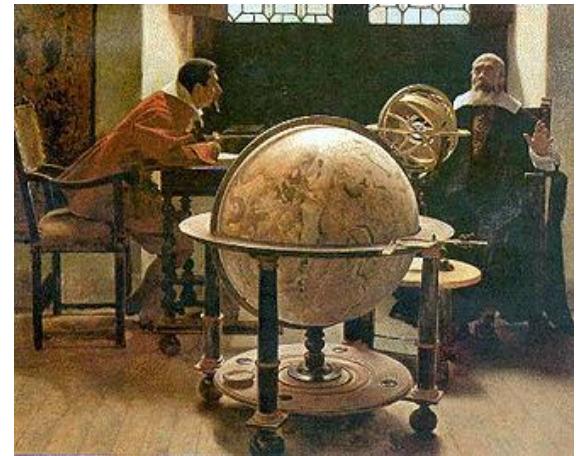


- **Francis Bacon** (1561 - 1626), was one of the greatest movers behind the development of the scientific method.



"If a man will begin with certainties, he shall end in doubts; but if he will be content to begin with doubts, he shall end in certainties."

Galileo (1564 - 1642) is generally remembered for his famous telescope and consequent astronomical observations , but he also contributed greatly to the scientific method.



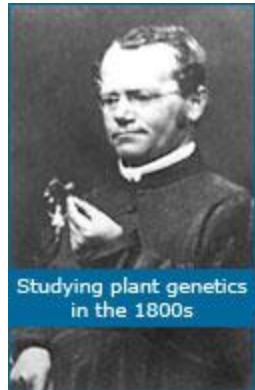
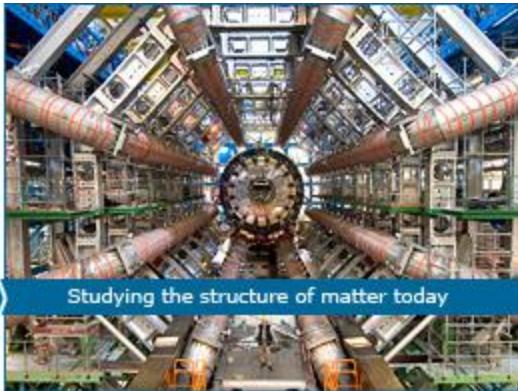
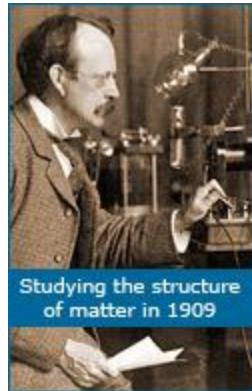
"All truths are easy to understand once they are discovered; the point is to discover them"

- This period, covering the 16th and 17th century and threw out some more elements required for the scientific method.



Newton (1642 - 1727) developed his four rules of reasoning. His inductive approach formed the basis for much of natural philosophy through the 18th and early 19th centuries

Scientific research has come a long way in the last 200 years!



Publication and peer review

The rise of the Internet has enabled scientific results to be publicized more rapidly than ever before possible

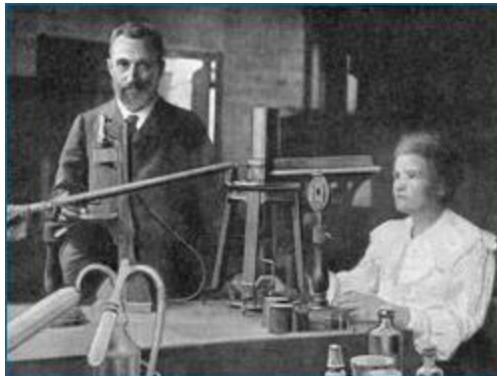


Image source: <http://bit.ly/x2pms8>

As our scientific knowledge has advanced, research has become more specialized and more **cross-disciplinary collaboration** became necessary.



Scientific and governmental organizations have set up guidelines and regulations to minimize potentially negative impacts and ensure that research is carried out ethically.



Let's summarize

The Intimate Relation between Science & Civilization



Egypt is a living testimony: the power of knowledge and the progress of society. Its innovations spanned from engineering to cosmetics products

The Library of Alexandria was a center of knowledge that gathered scholars from all over the world.





Cairo was one of the most prominent cultural centers of the Islamic civilization.

In the years to follow, Cairo shone as the center for studies and cultural activities in literature, arts, science, and media..



The future is even greener





Station 2 reached ... moving to station 3

Station 3:

10 Things you should KNOW

To Keep You Moving Forward



1. You USE it without knowing

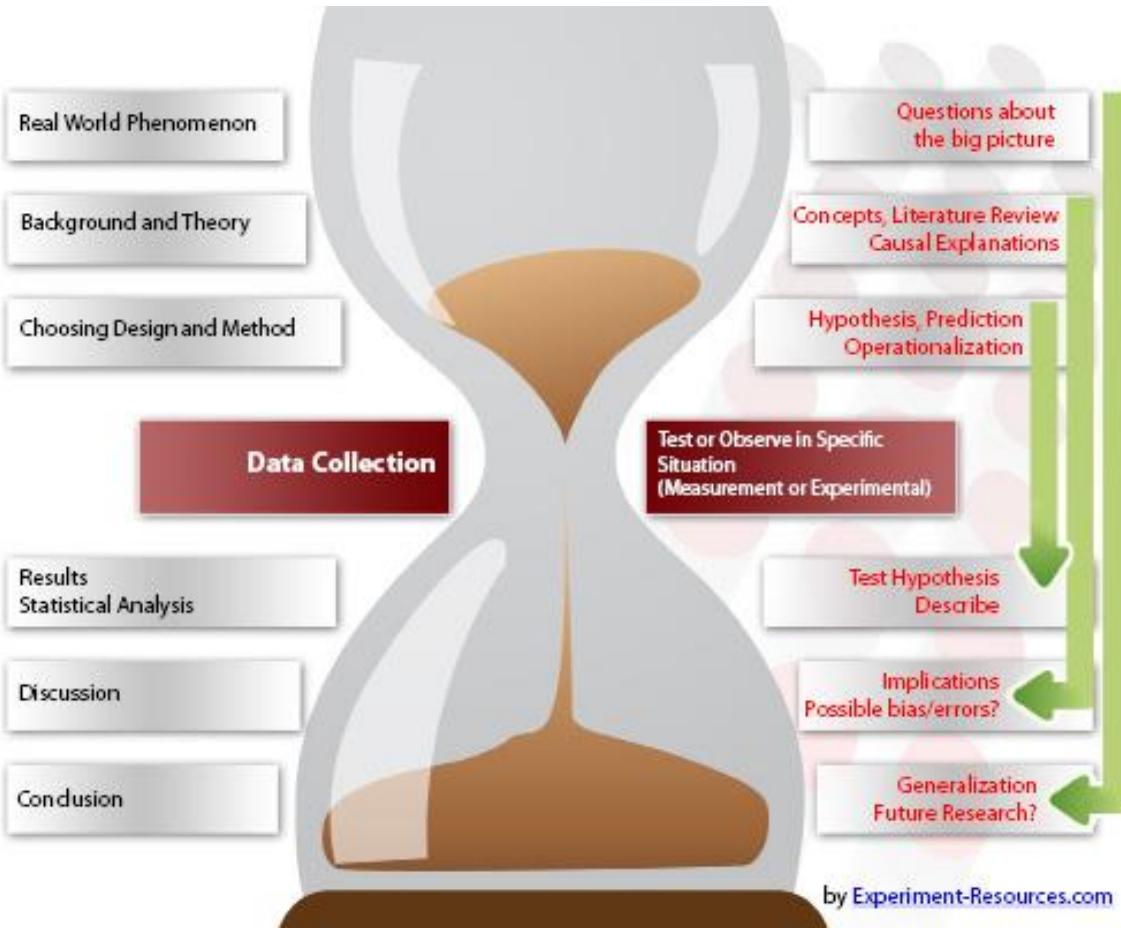
Every baby
knows the

scientific method



Your research skills
started long time
ago ☺

2. It is a Widely-used Skill



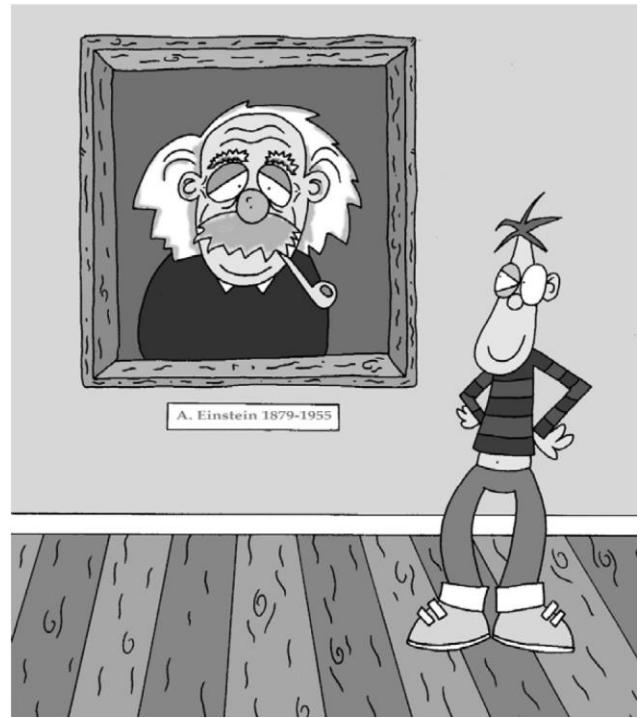
Widely used in almost all fields

by Experiment-Resources.com

3. It is a skill, and thus can be LEARNED

It is a skill that can be learned

- One doesn't need to be *Super genius* to be a good researcher.
- Research needs skills that can be *learned*.



**4. The competition is HIGH. So
START NOW**

Start as early as possible!

It's not too early or too late to get hands on a research project that inspires you.



**5. You are a FUTURISTIC search
engine that seeks WISDOM**

You are a futuristic search engine!



**6. Success is all about being
Innovative – Collaborative –
Ethical
So, be one**

Innovation links R & E

Reseach

Entrepreneurship

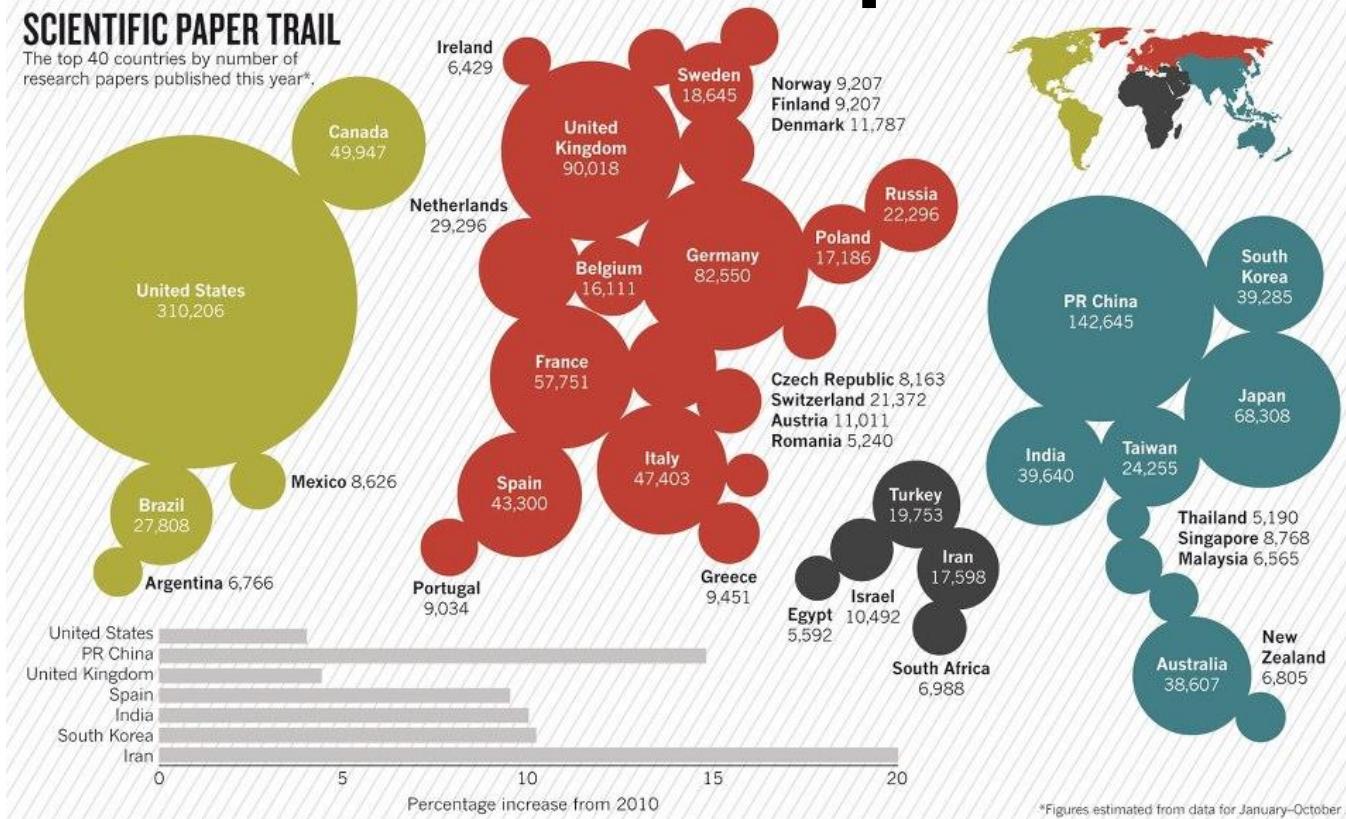


**7. We are still on the MAP. We
just need guidance and UNITY**

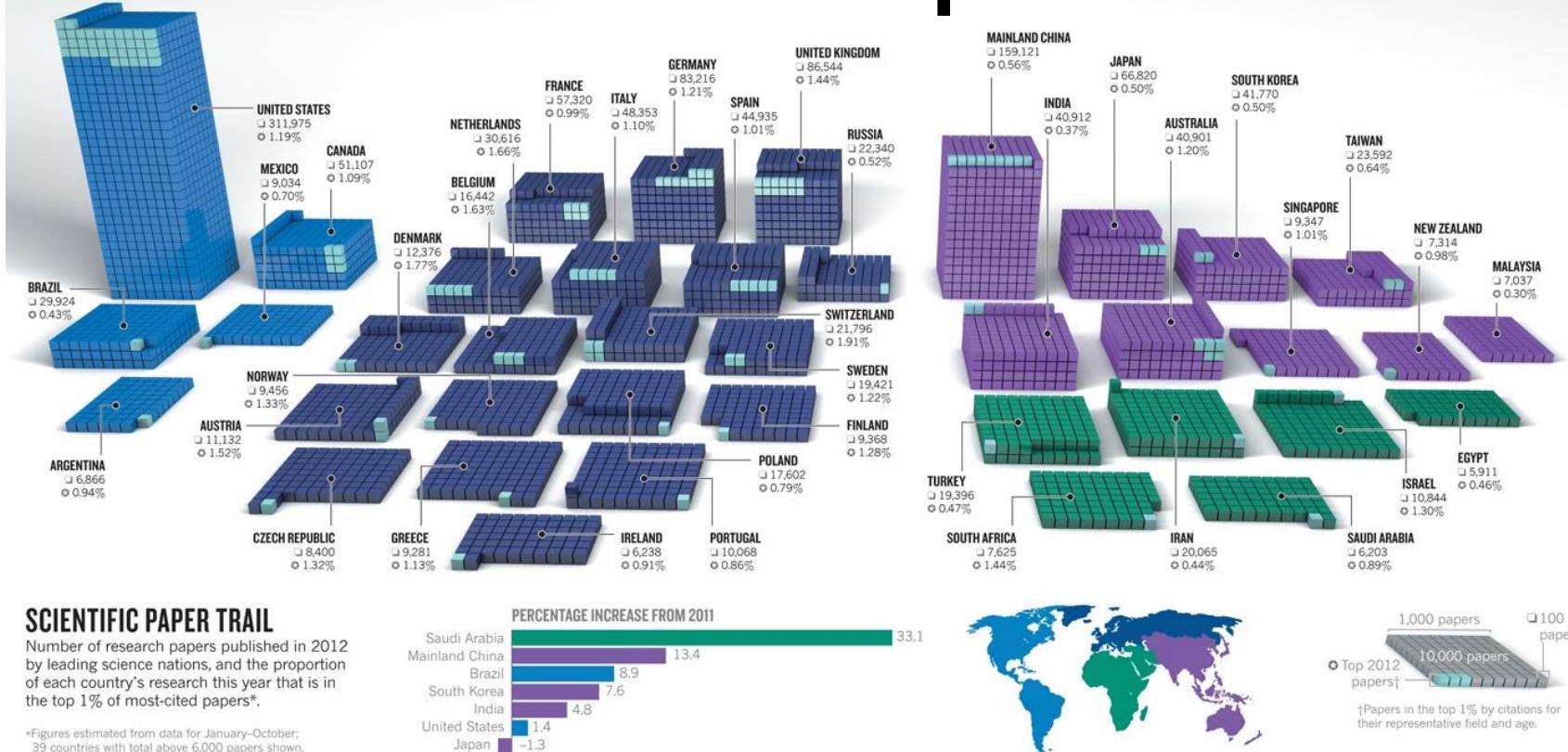
2011 map

SCIENTIFIC PAPER TRAIL

The top 40 countries by number of research papers published this year*.



2012 map



Questions (C)

1. Write a note showing the change in Egypt from 2011 to 2012



Answer in the course group

8. We have some good Resources and Capabilities

Collaboration

Egypt plays a critical linking role in research in the Middle East and North Africa region

Table 7.1: Egypt's top 20 collaborating nations (co-authored publications, 2008)

United States	1692	Italy	244	Austria	145
Saudi Arabia	1095	United Arab Emirates	208	Belgium	140
Germany	996	China	195	India	135
Japan	703	Spain	195	Switzerland	135
United Kingdom	687	Netherlands	194	Sweden	110
Canada	432	Korea, Republic of	185	Turkey	98
France	274	Kuwait	175		

Source: Data provided by Elsevier

"Science and innovation in Egypt" Michael Bond, Heba Maram, Asmaa Soliman and Riham Khattab. Royal Society



Information and communication technology (ICT)



Egypt is one of the fastest growing IT economies in the world
Because of growing number of tech-savvy graduates

"Science and innovation in Egypt" Michael Bond, Heba Maram, Asmaa Soliman and Riham Khattab. Royal Scoiety



Mathematics

$$\frac{\partial}{\partial a} \ln f_{a,\sigma^2}(\xi_1) = \frac{(\xi_1 - a)}{\sigma^2} f_{a,\sigma^2}(\xi_1)$$
$$\int_{\mathbb{R}_+} T(x) \cdot \frac{\partial}{\partial \theta} f(x, \theta) dx = M \left(T(\xi) \cdot \frac{\partial}{\partial \theta} \ln L(\xi, \theta) \right) \int_{\mathbb{R}_+} f(x) dx$$
$$\int_{\mathbb{R}_+} T(x) \cdot \left(\frac{\partial}{\partial \theta} \ln L(x, \theta) \right) \cdot f(x, \theta) dx = \int_{\mathbb{R}_+} T(x) \left(\frac{\frac{\partial}{\partial \theta} f(x, \theta)}{f(x, \theta)} \right) f(x, \theta) dx$$
$$\frac{\partial}{\partial \theta} \ln T(\xi) = \frac{\partial}{\partial \theta} \int_{\mathbb{R}_+} T(x) f(x, \theta) dx = \int_{\mathbb{R}_+} \frac{\partial}{\partial \theta} T(x) f(x, \theta) dx$$

- Egypt exceeds the world average in citation impact for mathematics papers.

"Science and innovation in Egypt" Michael Bond, Heba Maram, Asmaa Soliman and Riham Khattab. Royal Scoiety



Natural resources



"Science and innovation in Egypt" Michael Bond, Heba Maram, Asmaa Soliman and Riham Khattab. Royal Society

9. We have an impressive Young population

Egypt's key strengths in research and innovation



Human capital
About 55% of the population under 25



**All of this signs hold the
promise of bright future
That we should believe in.**

**Restoring this great legacy will take
time and commitment, and
substantial change at many levels**



10. Every mind makes a difference

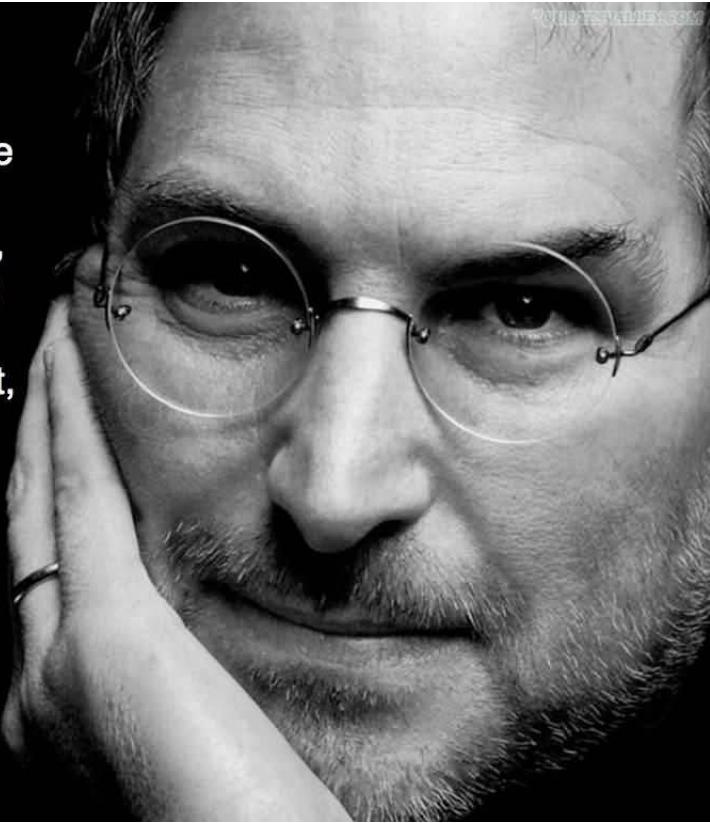
لأن كل عقل يفرق

الشعار ده مهم بالنسبة لنا لأن مشاركتك و عملك و علمك بغض النظر عن سنك أو جنسك أو لونك أو ديانتك أو كونك من ذوي الاحتياجات الخاصة أو حالتك الاجتماعية أو المادية أو مكان إقامتك كل ده مهم و يفرق جداً في بناء الوطن اللي بنحلم يكون مركز صناعي و علمي و حضاري يخدم شعبه و شعوب العالم كلها

متافقين؟

“The only way to do great work is to love what you do. If you haven't found it yet, keep looking. Don't settle. As with all matters of the heart, you'll know when you find it.”

- Steve Jobs



First discover your passion and build a plan to follow it

Questions (D)

1. After you knew the 10 points, what is your role in the cycle of generating a genuine research environment?



Answer in the course group



Station 3 reached ... moving to station 4

Station 4:

10 Things you should DO

Rules of Excellence



نصيحة غالبة

لا يوجد وقت متأخر لاختيار أو
تغيير التخصص طالما ذلك
يسعدك.

ضع دائماً أهدافاً محددة وطموحات عالية وابحث دائماً عن المسار الذي يحقق سعادتك ويشبع رغباتك في الإبداع والابتكار.

القاعدة الأولى

أفضل من يعلمك و يوجهك هو
أنت!

وسائل التواصل و البحث متوفرة لديك أكثر بكثير ممن سبقوك

القاعدة الثانية

أسأل دائمًا!

خصوصاً أستاذك و المتخصصين في المجال الذي تحب

القاعدة الثالثة

اهتم بفهم النظريات

من أين أتت؟ و ما هي جذور المسألة؟

القاعدة الرابعة

اهتم بالتطبيق العملي

أكثر شيء سيميزك + العمل الجماعي و ما يتربّع عليه من مهارات

القاعدة الخامسة

تطوع!

#حقائق_عن_التطوع

و لو بـ 3 ساعات أسبوعياً: أنشطة طلابية - مؤسسات تنموية

القاعدة السادسة

اصنع علاقات متينة

خصوصا مع أساتذتك و زملائك في العمل

القاعدة السابعة

كن متكامل الشخصية

كن بأخلاقك في كل المواقف و انظر إلى المجتمع قبل التخصيص

القاعدة الثامنة

التفوق ليس صمّاً

التفوق يجب أن يدفعك للأمام ... لكن احذر من المكاسب السريعة!

القاعدة التاسعة

اهتم بالجزء العملي و الأنشطة
لكن بحساب

في كل ما تفعل هدفك أن تتميز و تتفوق ... تكامل!

القاعدة العاشرة و الأُم

اعْزِمْ وَ تَوَكِّلْ وَ انْظُرْ لِلصُّورَةِ
الْكَبِيرِيِّ لِلأَشْيَاءِ

افهم دافعك الرئيسي و ضعه أمامك! بر والديك! غير مجتمعك!



Questions (E)

1. Which rule you apply most? Which one you apply least?
2. Where do you think you need help?



Answer in the course group



Station 4 reached ... moving to station 5

Station 5:

The journey shop

Resources



Knowledge



Intelligence

Benefit from online learning platforms

UDACITY

coursera



udemy



USQ
UNIVERSITY OF
SOUTHERN QUEENSLAND

edX



Take Steps

- Start to take steps toward excellence



عَامِلُ مَصْنَاعَةٍ

steps.egyptscholars.org



Some Free Publication Resources

- The public library of science: <http://www.plos.org/> where all articles are free
- The Proceeding of National Academy of Sciences www.pnas.org/content/by/year where articles more than six months old are available for free
- The Directory of Open Access Journals <http://www.doaj.org/> where you can find free journals on many different topics .



Mission Accomplished! 😊

**WELCOME
HOME**

What is next?

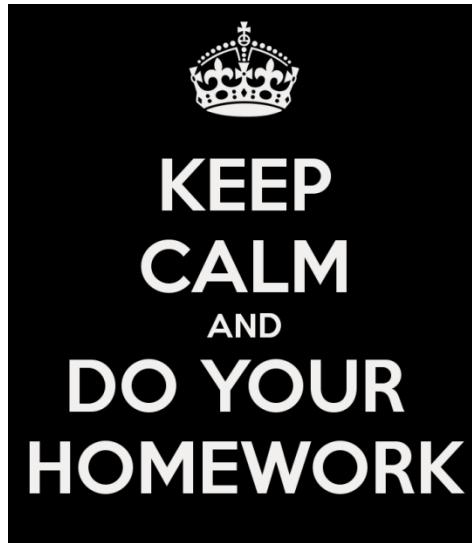
Fundamentals of Scientific Research



Webinars	Date
1. Scientific research – a stimulating voyage	Sun 26/1
2. Research avenue - a guided tour	Sat 1/2
3. The role of integrity – ethics and research conduct	Sat 8/2
4. The doing part – getting down to research	Sat 15/2
5. Publications I – your way to worldwide recognition	Sat 22/2
6. Publications II – technical writing: structure	Sat 1/3
7. Publications III – technical writing: style	Sat 8/3
8. Tools, tools, tools	Sat 15/3
9. Travelling abroad for research – expectations and adaptations	Sat 22/3
10. Panel discussion and Q&A	Sat 29/3

Remember to

Do your homework!



Question groups A to E

Send an email to: courses@egyptscholars.org

Title: Homework for ESSRS-1

Remember to

Support the cause of Egypt Scholars

Share

Tell

Encourage

Volunteer

Donate



جُمَاهِرُ عِلْمٍ مُصْلَحَاءِ

لأن كل عقل يفرق



Thank you!



Open for questions