



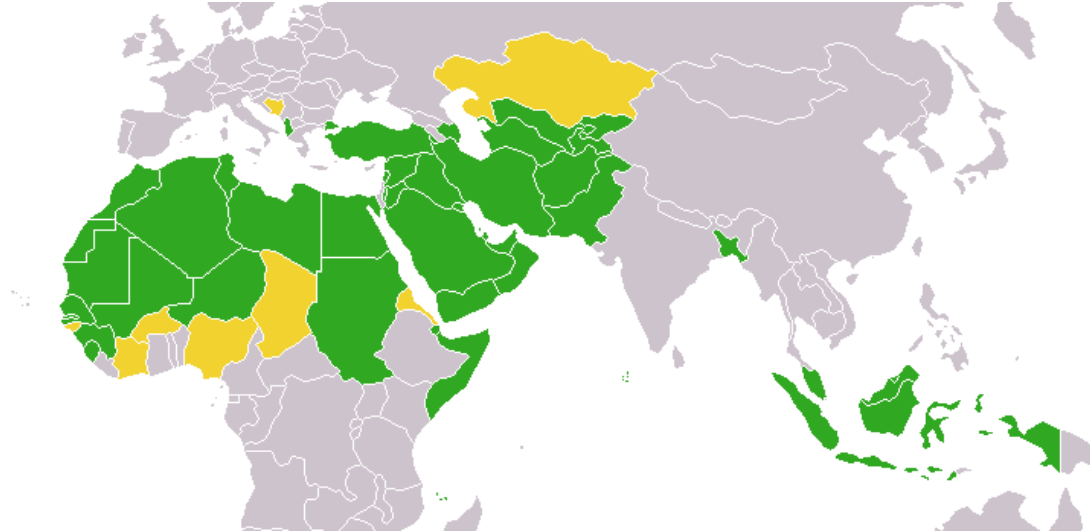
Obsolete concept of science in the Islamic World leads to distorted educational approaches

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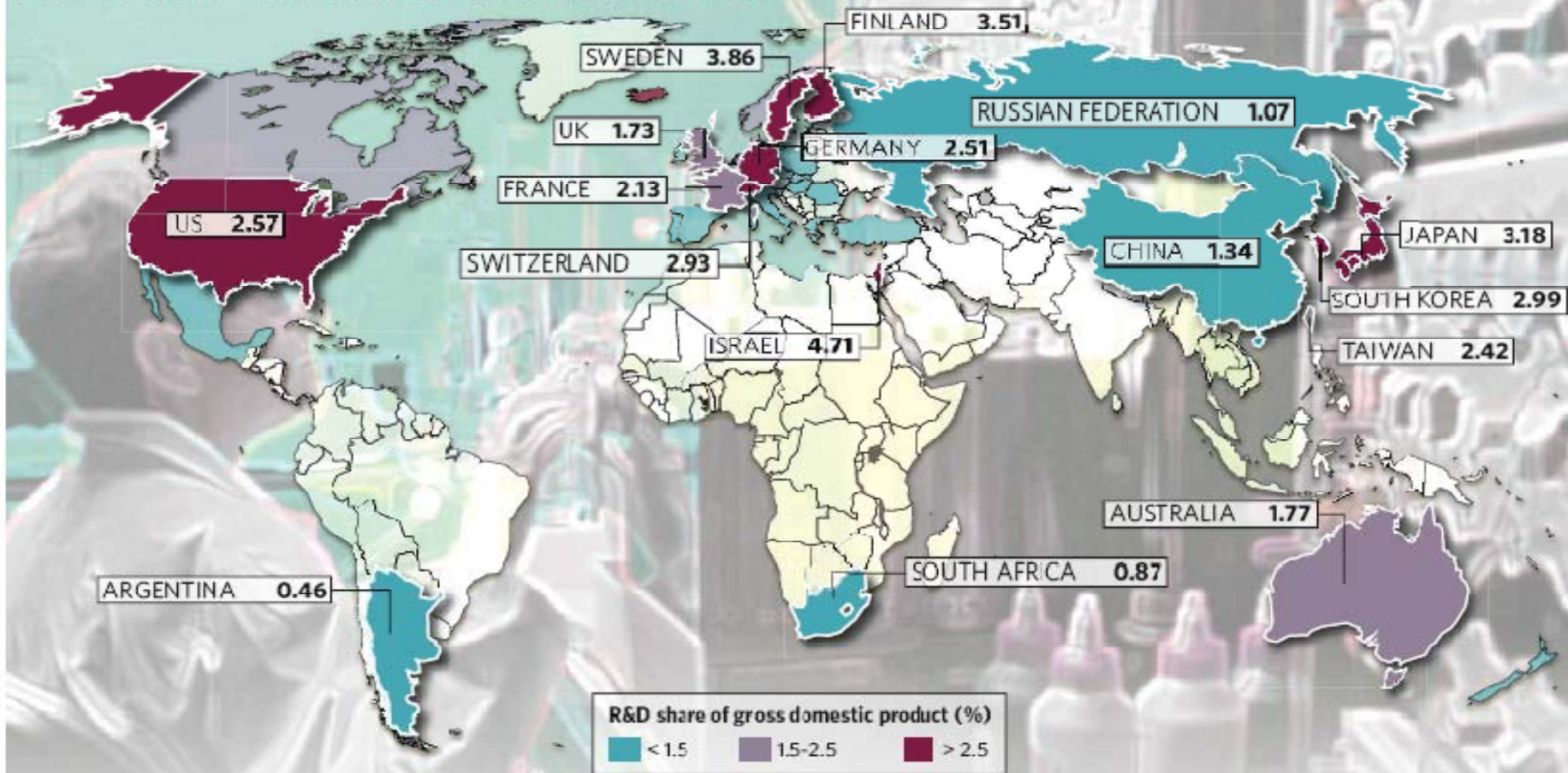
**Sharif University of Technology
&
Iranian National Observatory (INO), IPM**

Moslem World



- **Population: %20**
- **GDP < that of France**
- **Literacy < %50**
- **Scientific output: < %3**
- **Scientific output of most active Moslem countries/ USA (same population) ~ %10**

How the world invests in R&D



Data from 2008 National Science Foundation Science & Engineering Indicators; data are for most recent year available, and include civilian R&D only for Israel and Taiwan.

The latest analysis from the US National Science Board confirms that Israel leads the world in its economic devotion to research and development (R&D). Its civilian R&D spending in 2005 accounted for 4.71% of gross domestic product (GDP), more than twice the average among members of the Organisation

for Economic Co-operation and Development (OECD). Although US R&D investment was the world's largest — \$340 billion — and in 2004, it was more than that of the rest of the G7 nations combined, the report offers some evidence of a slight decline in its standing. Its 2.57% share of GDP

is comfortably above the OECD average of 2.25%, but both South Korea and Switzerland have leapfrogged ahead of the United States by this measure since the board's previous report in 2006. Germany could now be poised to do the same. Most countries are investing more in R&D than they were, says

Arden Bement, director of the National Science Foundation, which published the report. For example, although China ranks 23rd in GDP share — just 1.34% — it has pulled ahead to third in total R&D investment with an estimated \$115 billion in 2005. Rachel Courtland

Did you know that

- there is no university from the Muslim world within the top 500 universities of the world ([World Universities' ranking, Top Middle East, OIC Ranking](#))?
- the science [production](#) in the Muslim world, except in [Iran and Turkey](#), is almost stagnating?
- none of the countries in the Muslim world, despite many attempts and legislative actions, could increase its R&D expenditures above 0.7% of its GDP?

...that

- the human development indices in the Muslim world is catastrophically low?
- the rise of fundamentalism in the Muslim countries is independent of how poor or rich they are? **Is it a universality?**

and why

- 5-7 centuries of Islamic scientific and intellectual leadership did not lead to the emergence of the modern science?

Year:2006
Subject Area: Physics and Astronomy

Arab Countries	% World	Arab Countries	% World
Iraq	0.01	Libya	0.00
Syria	0.01	Tunisia	0.13
Lebanon	0.03	Algeria	0.18
Jordan	0.05	Morocco	0.10
Saudi Arabia	0.10	Mauritania	0.00
Bahrain	0.01	Sudan	0.01
Qatar	0.01	Somalia	0.00
U. A. Emirates	0.03	Palestine	0.01
Oman	0.02	Djibouti	0.00
Yemen	0.01	Comoros	0.00
Kuwait	0.02	Western Sahara	0.00
Egypt	0.25		
Total 0.98			

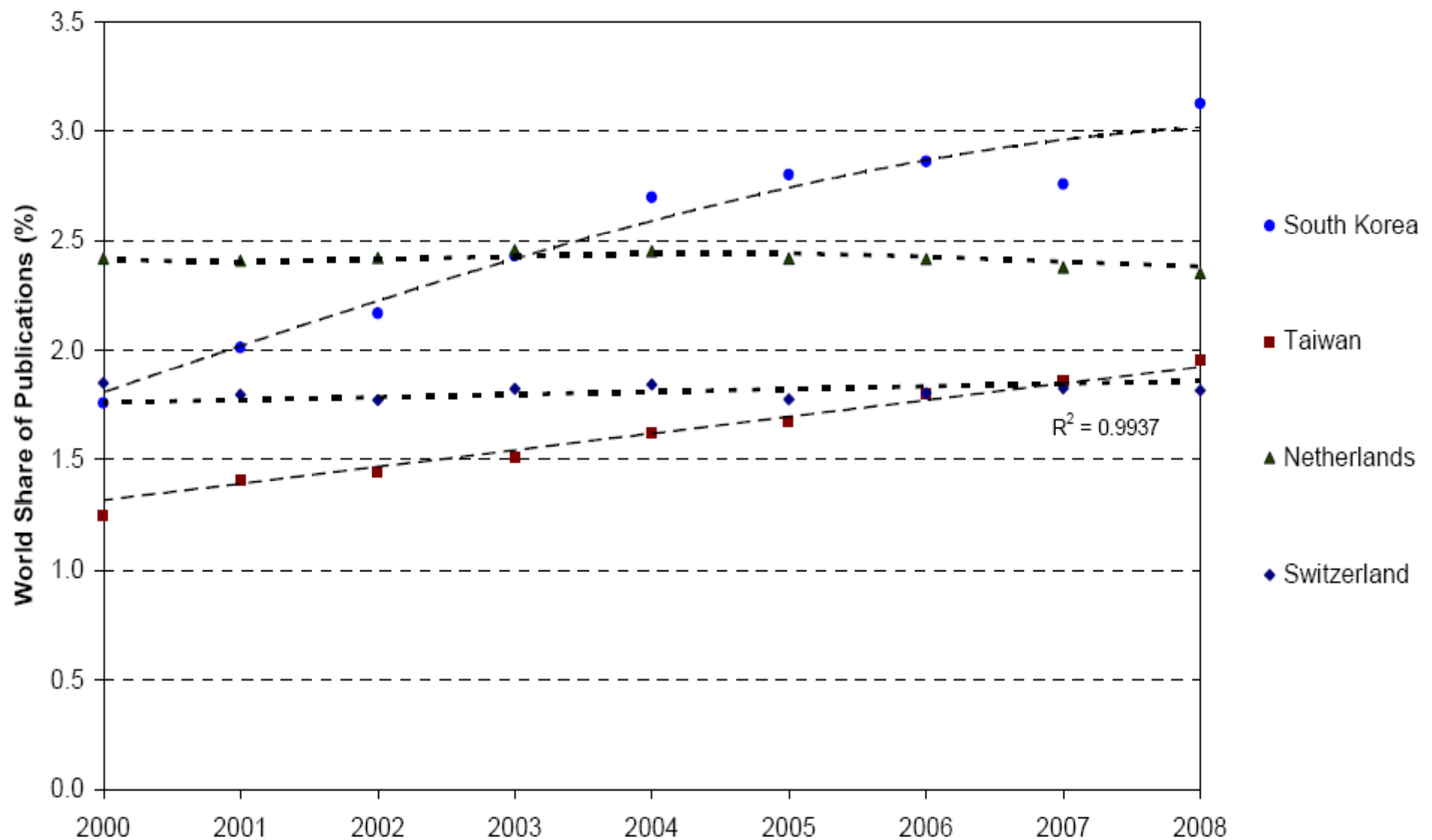
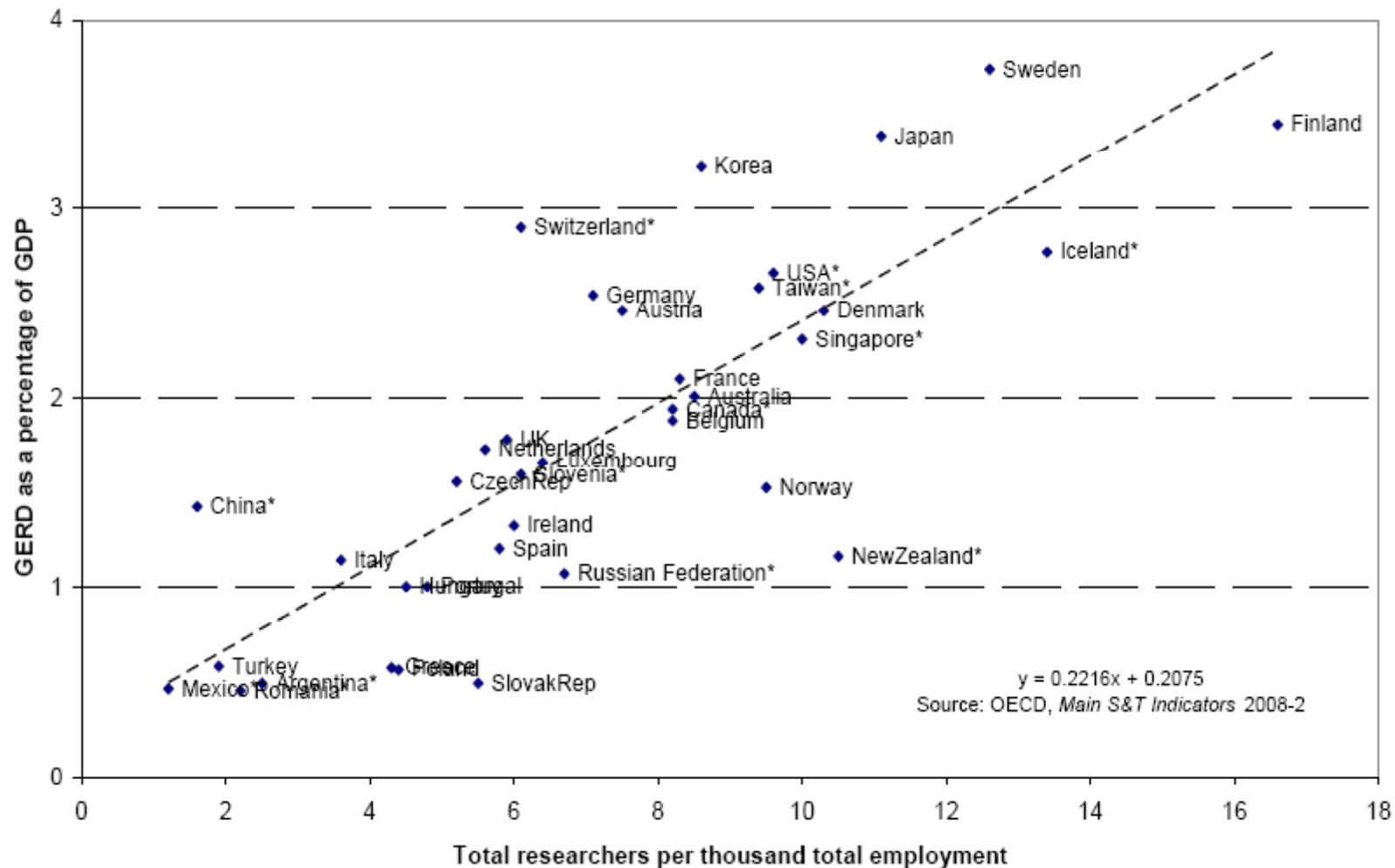


Figure 2: World Share of Publications for some smaller nations 2000-2008; based on articles, proceedings papers, reviews, and letters published in journals covered by the *Science Citation Index*.

GERD versus Number of Researcher



S&E Policies in Vacuum?

Do we mean same concepts while using terms
such as science and education?

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The Aim of Education

- Be a good citizen:
 - according to a religious believe (homo Islamicus)?
 - according to the needs of a modern diversified society?
 - get youngsters familiar with the knowledge available?
 - or....?

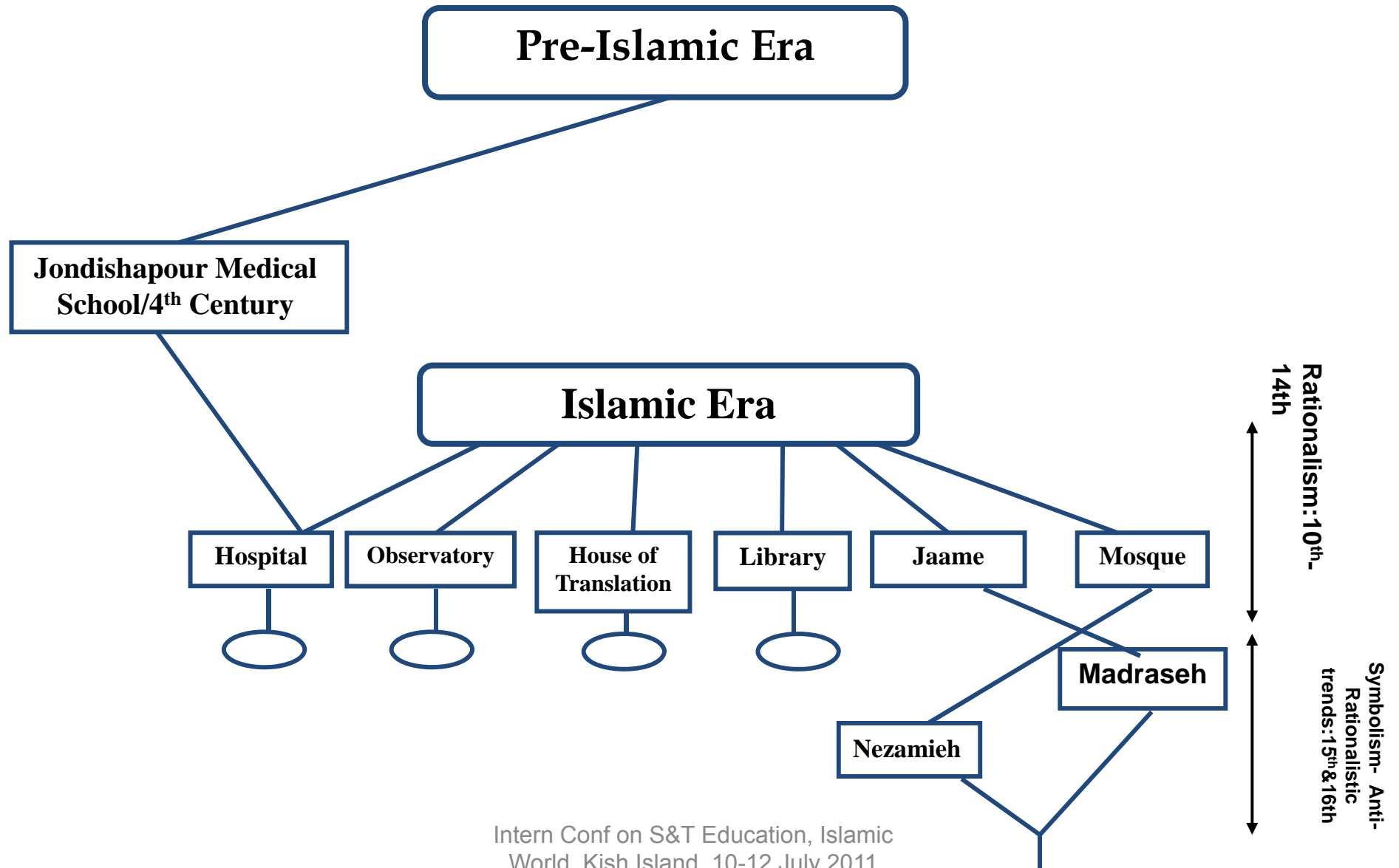
Which educational Aim

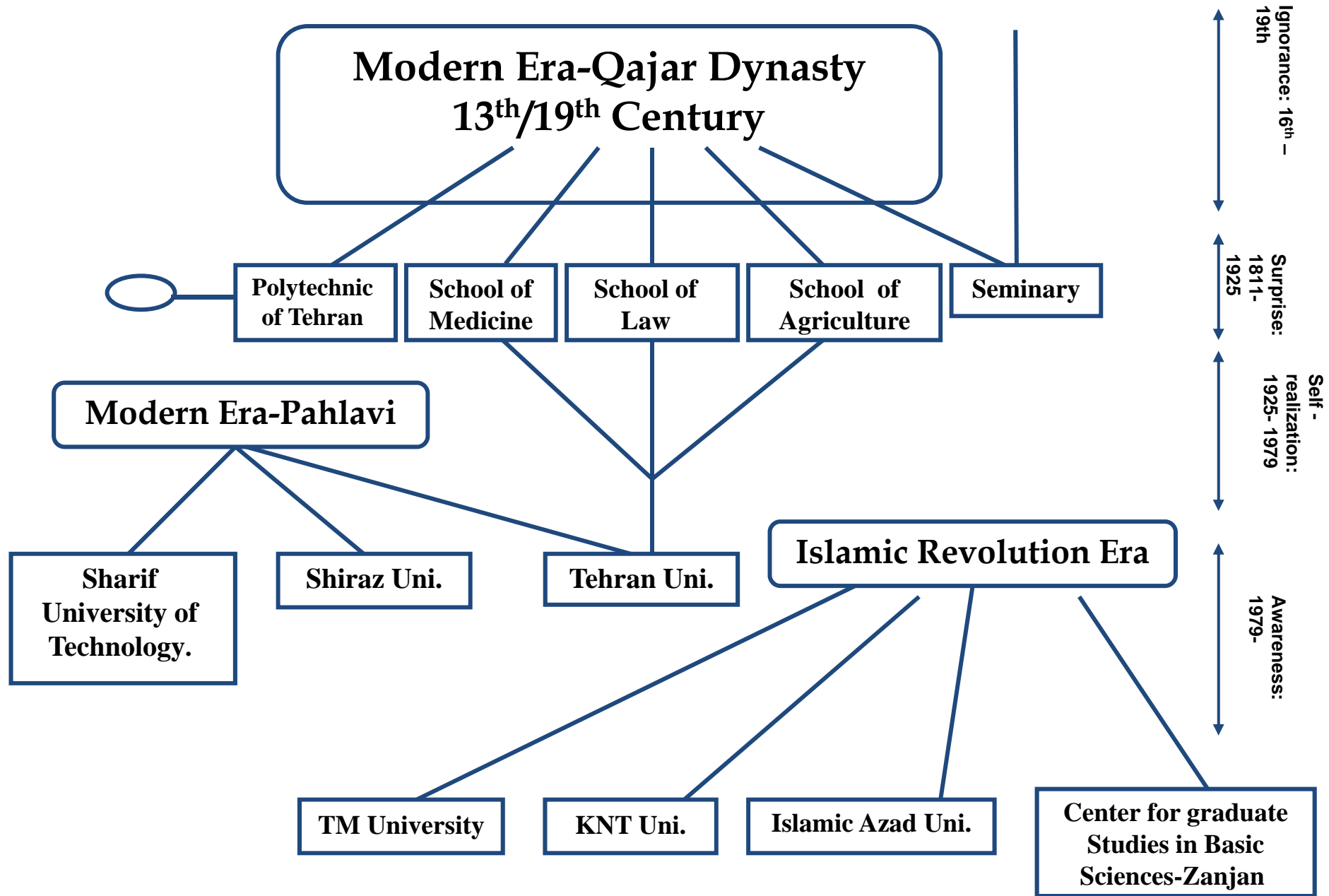
- Irrespective of which aim our society has chosen, we should be aware of the distorted concept of science due to the past glorious time of science in Islamic countries. Consciousness about this obsolete concept of science is crucial to the implementation of any educational system.

Educational Challenges of the Muslim World: Psychological situation

- **Belief in superiority of Islam and the Muslim world versus the apparent lack of development;**
- **Belief in liberal and humanistic tradition of the Muslim world versus disbelief in liberalism and democracy assertions of the West;**

Discontinued Tradition





Symbolism; Anti-rationalistic trends: 15th & 16th

Ghazali & Nezam-ol-molk:

Philosophy reduced to ethics;

Science only deemed useful as it served a rigid
theology;

Beginning of an era where **science was reduced
to theology.**

Ignorance: 16th – 19th

- “..we have, therefore, proved there is no need to teach philosophy except what the “ulama” have decided to include in their sciences. Therefore, the Sheikh-ol-islam has to be careful not to allow anyone to be taught ...”

Solouk-ol-molouk,
Fazl-ol-lah Rouzbehaan,
Contemporary to Galileo

Surprise: 1811 - 1925

...a large and right building has been constructed in Tehran's Arg square for the education of all techniques and is named Dar-ol-fonoun and it is the intention of his imperial majesty that the children of his government learn some sciences not prevalent in our country...

Vaghaye-e Ettefaaghiyeh, 1268/1852

Self-realization: 1925 - 1979

...you are requested to study the number of teachers and the kind of facilities needed for the establishment of a Dar-ol-fonoun offering medical pedagogy and road building engineering (paved roads and railways) in Tehran and also to find out about the approximate costs...

Teimour Taash, Reza Shah's minister of court, to Issa Sadigh at Coloumbia university, 1932

Research?

During the establishment of the colleges of literature and sciences I recognized that the objective was not merely to train a number of students in a subject, but research should also be one of the aims of a university. To achieve this goal, first of all, lectures taught by professors are to be limited to their specific fields. Therefore, a professor of geography can not be assigned to instruct history... and professors should translate important resources they had used for their lectures...

Isa Sadigh, Memoires, 1969

Awareness: 1979-

- Different policy papers;
- Four five years economic development plans: sections for S&T;
- Huge increase in almost any scientometric parameter.

Concept of Science

Modernity and the Science concept

- The concepts of S&T are social constructs on which modernity is based;
- Modern rationality and the social and cultural values related to it are based heavily on the modern concept of science;
- The modern concept of time, so crucial in modern life, is directly connected to the concept of dynamics in the natural sciences.

Science Policy *is* a Modern Science

- Modern Science is based on two main concepts:
- Reductionism;
- Model building
 - Dynamics and the concept of time plays a crucial role

Model Building I

For any natural or social phenomenon we propose a model;

Any model consists of concepts and rules:

Gravitation:

1. Newtonian model (gravitational force, absolute space and time)
2. General relativity of Einstein (curved and relative space-time, gravitational field)

Model building II

Universalities:

- The motion of a projectile is model independent.
- Some universalities are phenomenological: extracted from observed cases.

Model building III

- We may have different models, but there seems to be **universalities and model independent characteristics**. Educational models are not an exception!

Implementation of a model needs infrastructure: It is a technology!

Concepts and Technology

- Speaking about concepts like car, airplane laser, and NMR doesn't mean we may produce them!
- Production means a long process including an infrastructure and a specific 'culture', a specific way of thinking!

Two Crucial Elements of Modern Science

- Scientific Community
- Scientific Discourse

Scientific Community & Discourse

- Professional organizations
- Intensive communications
- Journals
- Meetings
- Peer review
- Internationality
- Interaction with public sphere

Scientific Discourse?

- Do we have regular scientific communications within our country?
- Do we have any impact of our scientific work within our national community?
- Are we ever asked within our country about the scientific issues of relevance to our national needs?

Scientific Community

- Do we have a scientific community in our country?
- Do we have enough active scientific organizations?
- Do we have a national scientific language?
- Do we have standard equivalents to basic terminology of science in our national language?
- Do we have a peer review system within our countries?

Scientific Community

- Non-existent in Iran?

(see the paper by Khosrokhavar)

Farhad Khosrokhavar, Shapour Etemad, Masoud Mehrabi,
Report on Science in Post-revolutionary Iran

Part I: Emergence of a Scientific Community? Critique, vol. 13, n° 2, 2004 pp. 209-224;

Part II: The Scientific Community's Problems of Identity, Critique, vol. 13, n° 3, 2004 pp 363-382;

Part III: Iranian Studies, June 2006, Farhad Khosrokhavar and R. Amin Ghaneirad: Iran's New Scientific Community.

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Concepts of Science within Islamic Countries

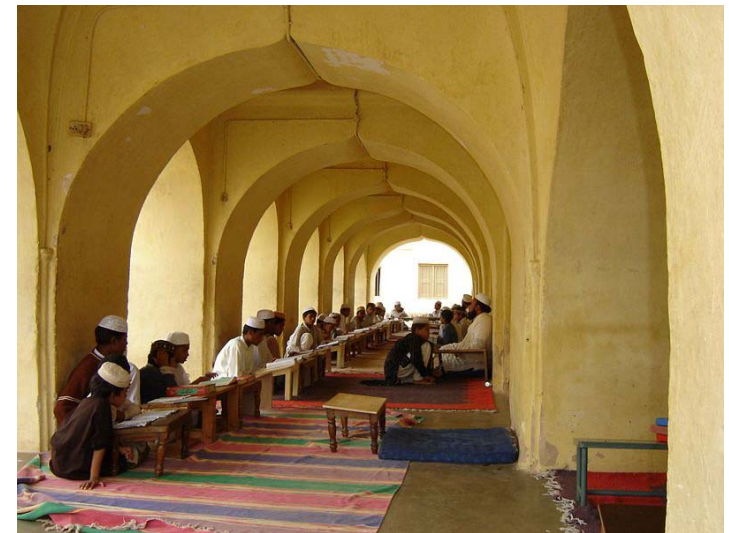
Different Concepts of Science

- 1. Theology as science (elm);
- 2. Pre-Galilean natural philosophy as science (elm);
- 3. Contents of text-books as science (modern elm);
- 4. Modern concept of science as a process of knowledge creation(non-existent in Moslem countries?)

What is 'Elm'?

- Elm is an 'existent' entity. It is not a process; it is not created. In opposite to science which is an evolving entity.
- Learning, not producing, knowledge.
- Memorizing.
- Reading books not producing...

- There are more than 50,000 madrasehs currently (as of 1998) operating in Pakistan. It is estimated that one to two million children are enrolled in madrasehs.



Most prevalent concept of Science

Science of religion, not to be identified with the religious knowledge, is the basis, added to it some knowledge (not science, just data): **obsolete concept of science**

Science concept in the Moslem world

- **Elm is subordinate to theology, at least at the procedural level;**
- **as a result, rationality in the Moslem world is not based on science, but on religion;**
- **cultural and social values of the society are almost completely determined by religion;**
- **any educational imperative is inherently related to this concept, which is an obsolete one!**

Elm and degrees can be acquired like any other consumable good

- Elm is represented by those having a degree. Therefore, having a degree is equivalent of being a scientist. Being a scientist is attractive. Having a degree is therefore attractive. One should have a degree under any circumstance. Should it be difficult to achieve it, it may be paid for.

Consequences of the obsolete concept of science I

- **Utilitarian science concept:** just those ingredients of modern knowledge is acceptable which are of some use to religion or traditions;
- Identification of values based purely on religion (**primary values**) and those based on science (**secondary values**);
- Coupling of primary and secondary values as an impediment to accept any kind of modern educational procedures leading to innovation.

Consequences of the Obsolete Concept of Science II

- Underdevelopment in S&T&E and insisting to teach the obsolete concept of science, from primary school to university level, strengthens the belief on the secondary values as the primary ones, identifying them as the religious values, and makes it impossible to accept educational methods for creative thinking.

Obsolete versus modern concept of science

- Sacredness **versus** non-existent of any sacred value in modern science;
- Truth defined by sacred values **versus** procedural correctness;
- Reference to (holy) texts **versus** doubt;
- Belief **versus** creativity;
- Direct (pre-determined) ways **versus** serendipity;
- Salvation **versus** power and economy;
- Sin **versus** failures;
- Hereafter **versus** peers

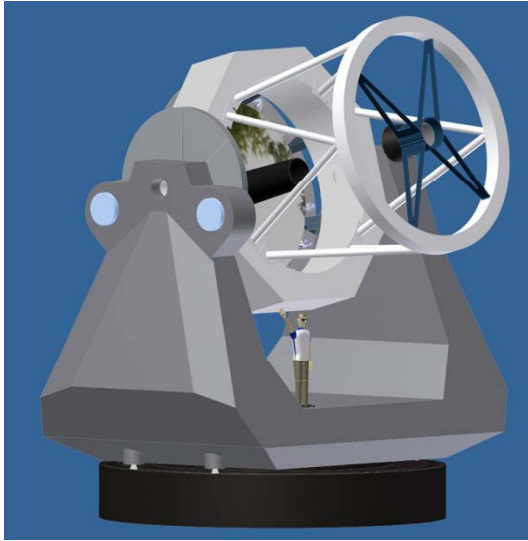
Versus peers.

Roadmap for a modern educational system

- **Theme 1:** Understanding the difference between the obsolete and modern concept of science: Pinpointing concrete procedural differences;
- **Theme 2:** Investing in creative thinking and innovation-based methods of education;
- **Theme 3:** Investing in science as a way of thinking and problem solving

References

- **Science in Islam: which way forward?**
News from ICTP, Autumn 2006, No. 118;
- **How an Obsolete Concept of Science Impedes the Development of Islamic Countries: The Example of Iran;**
Forum on International Physics Newsletter, APS, December 2007



Thank You!

Comments and criticism invited.

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