International Conference on Human Resource Development for Nuclear Power Programs: Building and Sustaining Capacity.

IAEA
International Atomic Energy Agency

12 – 16 May 2014, Vienna, Austria

Nuclear Education, Training and Outreach in Latin America and the Caribbean Region

LANENT
RED LATINOAMERICANA PARA LA EDUCACIÓN EN TECNOLOGÍA NUCLEAR

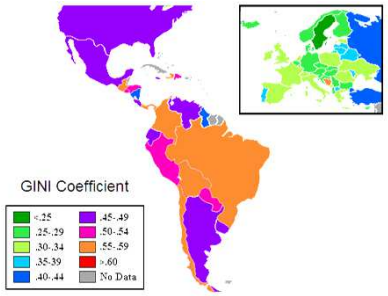
R. O. Barrachina, J. L. François and M. Sbaffoni

Facts

- Area: 21 x 10^6 km^2 — 5 x
- Population: 600 x 10^6 — 1.2 x
- GDP-nominal: 5 x 10^{12} USD — 0.3 x

absence of cultural or idiomatic barriers.
Português + Español = *Portuñol*

economic, social and cultural inequalities



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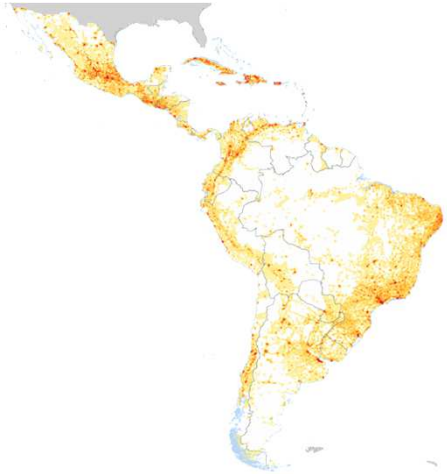


Status & Trends

NUCLEAR MEDICINE

Status & Trends

ATUCHA - ARGENTINA

ANGRAS - BRAZIL

EMBALSE - ARGENTINA

LAGUNA VERDE - MEXICO

Status & Trends

ATUCHA II - ARGENTINA

ANGRAS III - BRAZIL

CAREM - ARGENTINA

Status & Trends

RESEARCH REACTORS

Country	Name	Reactor Type	Thermal Power (kW)	Thermal Flux (n/cm2/s)	Fast Flux (n/cm2/s)	Criticality Date	
Argentina	RA-0	TANK	0	1.00E+07	1.00E+07	01/01/1965	
Argentina	RA-1 ENRICO FERMI REACTOR	TANK	40	1.50E+12	1.00E+12	20/01/1958	
Argentina	RA-3	POOL	5000	4.80E+13	1.40E+14	01/08/1968	
Argentina	RA-4 (EX. SUR-100)	HOMOG (S)	0	6.00E+07		01/01/1972	
Argentina	RA-6	POOL	500	1.10E+13	1.80E+12	23/09/1982	
Argentina	RA-8	CRIT ASSEMBLY	0	1.00E+08		17/06/1997	Temp. Shut.
Brazil	ARGONAUTA	ARGONAUT	0	4.40E+09	8.90E+09	20/02/1965	
Brazil	IEA-R1	POOL	5000	4.60E+13	1.30E+14	16/09/1957	
Brazil	IPEN/MB-01	CRIT ASSEMBLY	0	1.00E+09	6.00E+09	09/11/1988	
Brazil	IPR-RI	TRIGA MARK I	100	4.30E+12	1.50E+12	06/11/1960	
Chile	RECH-1	POOL	5000	7.00E+13	5.00E+13	13/10/1974	
Chile	RECH-2	POOL	2000	1.00E+13	1.00E+13	06/09/1989	Temp. Shut.
Colombia	IAN-R1	POOL	100			20/01/1965	
Jamaica	UWI CNS SLOWPOKE	SLOWPOKE	20	1.20E+12	1.00E+11	13/03/1984	
Mexico	CHICAGO MODELO 9000	SUBCRIT	0	2.60E+04	9.40E+04	14/05/1969	
Mexico	NUCLEAR CHICAGO MOD 2000	SUBCRIT	0	3.20E+04	1.20E+05	01/01/1969	
Mexico	TRIGA MARK III	TRIGA MARK III	1000	3.30E+13	3.10E+13	08/11/1968	
Peru	RP-0	CRIT ASSEMBLY	0	1.00E+07		20/07/1978	
Peru	RP-10	POOL	10000	1.20E+14	1.00E+14	30/11/1988	

Cooperation between academy and Industries

INVAP

INST BALSEIRO - ARGENTINA

Nuclear Education

UFRJ - BRAZIL

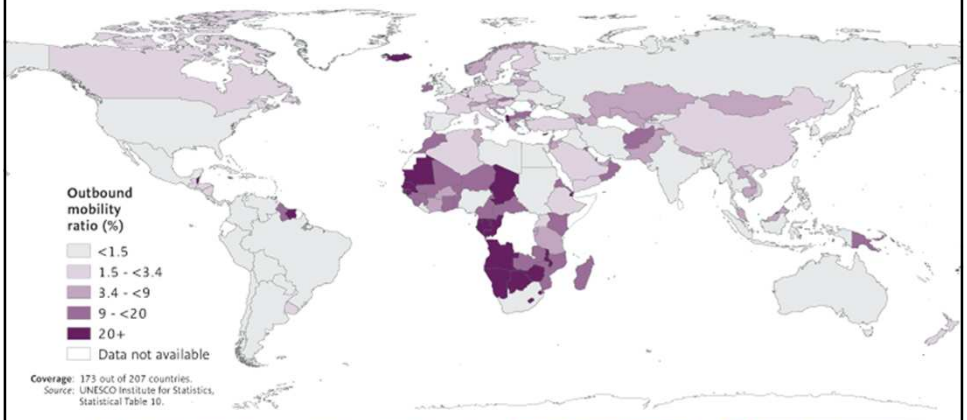
UAM – IZTAPALAPA - MEXICO

INST BALSEIRO - ARGENTINA

InSTEC- CUBA

Outbound Mobility

Mobile students from a given country as a percentage of tertiary students enrolled in that country (outbound mobility ratio), 2004






Higher Education

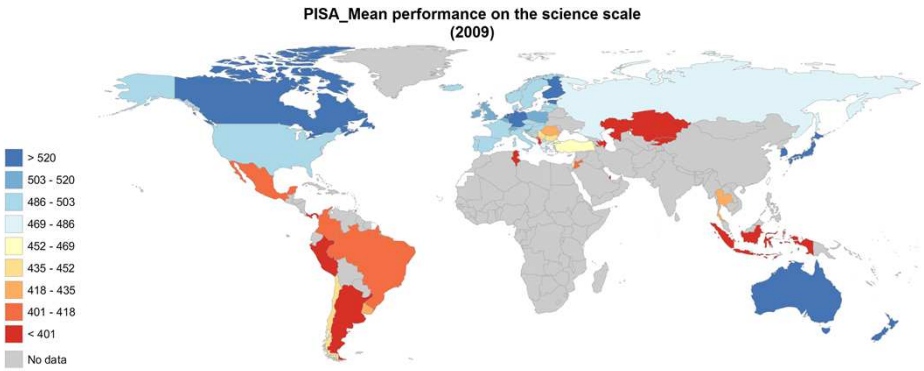
High dropout **25% -75 %**

Outreach

- Lack of interest of high school students for technical disciplines.
- Inadequate dissemination of existing careers and job opportunities.
- Gap between the secondary and the higher levels.

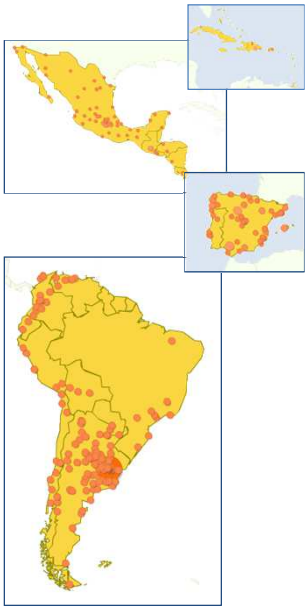
Outreach

OECD Programme for International Student Assessment (PISA)



OECD
BETTER POLICIES FOR BETTER LIVES

Outreach



10.000 visitors / year
from 600 cities

Post-Graduate Studies

Dan Beninson
Instituto de Tecnología Nuclear

INSTITUTO SABATO

Instituto Balseiro

FUNDACION ESCUELA MEDICINA NUCLEAR

CARN

CDTN
CDTN - Centro de Desenvolvimento da Tecnologia Nuclear

ien INSTITUTO DE engenharia nuclear

IRD

IME

UNIVERSIDADE DE SÃO PAULO
SUSCEPTA VINCES

UNIVERSIDADE FEDERAL DE MINAS GERAIS
7 DE SETEMBRO DE 1927

VIRTUS IMPAVIDA

UFRJ

IPEN

IPN

Casa abierta al tiempo
UNIVERSIDAD AUTÓNOMA METROPOLITANA

UNIVERSIDAD DE GUANAJUATO

ESTADOS UNIDOS MEXICANOS
UNIVERSIDAD AUTÓNOMA

UNAM

The Academic Puzzle

- MAESTRÍA
- MÁSTER
- MAGISTER
- MAGISTER SCIENTIAE
- …

Example: the "Master" certificate might have different names, different meanings and address different levels and capacities throughout the region.

Evaluation of academic institutions

CAPES (Coordenação de aperfeiçoamento de pessoal de nível superior).
Level 7: (internationally competitive)
Level 6: (excellent)
Level 5: (very good)
Level 4: (good)
Level 3: (acceptable)

LANENT

The Latin American Network for Education in Nuclear Technology (LANENT) was set up to contribute to preserving, promoting and sharing nuclear knowledge as well as fostering the transfer of nuclear knowledge in the Latin American region.

Consultancy Meeting	Bariloche	Argentina	20-24 April	2009
Consultancy Meeting	Vienna	Austria	1-3 September	2010
Technical Meeting	Lima	Peru	6-8 December	2010

BARILOCHE

VIENNA

LIMA

General Assemblies

Lima, Peru, 6 – 8 December 2010

Santiago, Chile, 17 – 20 October 2011

Cuernavaca, Mexico, 5 – 9 May 2014

Members

Members

ARGENTINA, BOLIVIA, BRASIL, CHILE,
CUBA, ECUADOR, MÉXICO, NICARAGUA,
PARAGUAY, PERÚ, URUGUAY, (ESPAÑA)

Networking

- **REMECIN**
  Red Mexicana de Educación, Capacitación e Investigación Nuclear

- **RAEN**
  Red Argentina de Educación Nuclear

Networking Networks

- General Assembly ENEN
  - Madrid, March 2011
  - Saclay, March 2012
  - Vienna, March 2013
- IFNEC
  - Paris, April 2011
- IAEA
  - December 2011
  - November 2012
  - February 2013
  - June 2013
- AATN
  - Buenos Aires, Dec 2012
- ICENES
  - Madrid, March 2013

- A Common Action Plan was signed during the IAEA 57th General Conference (Sep 2013)

AFRA NEST

ANENT

LANENT

CEIDEN
PLATAFORMA TECNOLÓGICA DE ENERGÍA NUCLEAR DE FISIÓN

Activities

- WEB page, including an educative portal

- Courses and careers

- Educative material

- Outreach

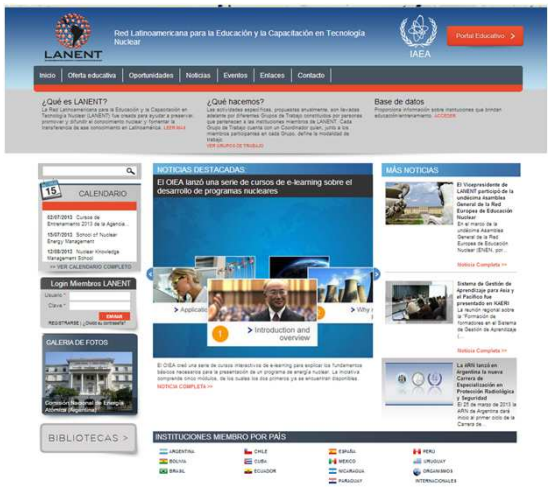
- Pedagogical Support

- Communication

- Technical Cooperation Project RLA0048, "Networking for Nuclear Education, Training, Outreach and Knowledge Sharing

WEB Page

- WEB page, including an educative portal



http://www.lanent-iaea.org/

CLP4NET

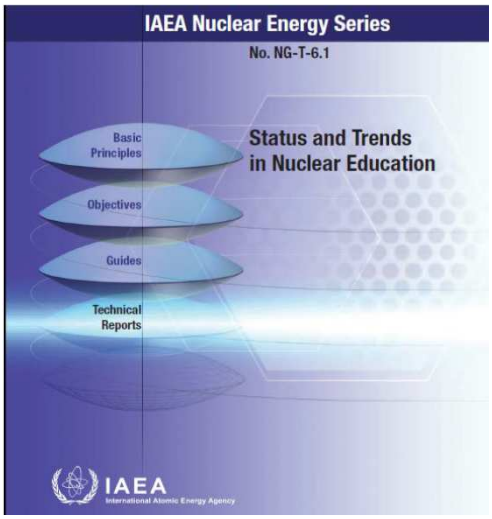
- WEB page, including an educative portal

- In September 2012, Alexander Bychkov, general director of IAEA and Norma Boero, president of the National Atomic Energy Commission of Argentina (CNEA) signed Practical Arrangements, by which the CNEA will install and operate the IAEA Cyber Learning Platform and becomes the first hub for Latin America.

CONCLUSIONS

LANENT has been actively pursuing joint activities for networking educational institutions at a regional level, the creation of distance learning initiatives and the use of shared facilities. Let us hope that these initial endeavors in nuclear education and training would ultimately contribute to the common and cooperative development of a technology so essential for the present and the future of our region.

Regional Status and Trends



"The purpose of this report is to support the development of policies and strategies in nuclear education as part of the overall activities on nuclear knowledge management. This includes: key issues of nuclear education and national and regional needs and expectations; fostering strong regional or inter-regional nuclear education networks; promoting the harmonization of curricula in nuclear education and training programmes; addressing the use of nuclear facilities to enhance education, research, and to maintain capability; addressing national best practices in nuclear education; and analysing and sharing information to facilitate the further development of nuclear education."

THANK YOU
GRACIAS
OBRIGADO

DEFINITIONS

- **GINI index:** A measurement of the income distribution of a country's residents. This number, which ranges between 0 and 1 and is based on residents' net income, helps define the gap between the rich and the poor, with 0 representing perfect equality and 1 representing perfect inequality.
- **GDP** is commonly used as an indicator of the economic health of a country, as well as to gauge a country's standard of living
- **OECD (**Organization for Economic Co-operation and Development, global policy forum) is an International organization helping governments tackle the economic, social and governance challenges of a globalized economy.

DEFINITIONS

- **OUTBOUND MOBILITY**: Any form of international mobility that takes place within a student's programme of study in higher education (HE). The length of absence ranges from a short trip to a full-duration programme of study such as a degree. In addition to study at a foreign institution, mobility can also involve a period in a workplace or other non-HE environments

NPPs -Argentina

Operating Argentine nuclear power reactors

Reactor	Location	Model	Net MWe	First power
Atucha 1	100 km NW of Buenos Aires	PHWR (Siemens)	335	1974
Embalse	Córdoba	PHWR (CANDU-6)	600	1983
Total (2)			**935 MWe**	

NPPs - Brazil

Power generation	
Units operational	1 x 637 MW 1 x 1,350 MW
Units under const.	1 x 1,405 MW
Annual generation	12,983

NPPs - Mexico

Operating Mexican power reactors

Reactors	Model	Net MWe	First power	Operating to
Laguna Verde 1	BWR	800 approx	1989	2029
Laguna Verde 2	BWR	800 approx	1994	2034
Total (2)		1600 MWe		