SCK•CEN
STUDIECENTRUM VOOR KERNENERGIE
CENTRE D'ÉTUDE DE L'ÉNERGIE NUCLÉAIRE

A transdisciplinary approach to education and training in radiological protection

Gaston Meskens
SCK•CEN

ETRAP2005, 25 November 2005

SCK•CEN
STUDIECENTRUM VOOR KERNENERGIE
CENTRE D'ÉTUDE DE L'ÉNERGIE NUCLÉAIRE

A transdisciplinary approach to education and training in radiological protection

Education and training in 'the real world'

Complex problem solving

Transdisciplinarity

PISA – an experiment in second mode science

Conclusions

Education and training in ‘the real world’

The learning environment for continuous education includes the workplace (‘the real world’)

learning environment :

theory	gather ‘information’	gaining factual and methodological knowledge
practice (laboratory)	gather ‘information’	gaining practical knowledge
practice (workplace)	perceive ‘observation’	acting (interacting), relying on knowledge and ‘experience’

Education and training in ‘the real world’

What if ?

What if an experienced older worker says one day : “I don’t go anymore into the controlled area. I suddenly got scared of radiation” ?

What if a waste management authority offers money while calling candidate municipalities to voluntary accept a waste disposal site in their village ?

What about paying people to test new medicines ?

Complex problem solving in ‘the real world’

Responsible acting, facing the uncertainty and ambiguity of the ‘real world’:

acting

► for which there exists no factual logic or procedures ‘in the books’

► that you cannot train in the laboratory

► for which you cannot always rely on similar (comparable) cases from the past

Complex problem solving
Characteristics of a ‘complex problem’

interconnection	there is no single problem, but a related web of problems
incompatibility	different points of view are possible, inspired by different scientific disciplines (economy, sociology, …).
multidimensionality	in space (local, global); in time (intra-generational, intergenerational)
pluralism of values	lack of generally accepted standards and values to support development

SCK • CEN
STUDIECENTRUM VOOR KERNENERGIE
CENTRE D'ÉTUDE DE L'ÉNERGIE NUCLÉAIRE

Complex problem solving
Characteristics of a 'complex problem'

example : paying people to test new medicines

interconnection - a related web of problems

incompatibility - different points of view

multidimensionality – in space and time

pluralism of values - no generally accepted standards

SCK • CEN
STUDIECENTRUM VOOR KERNENERGIE
CENTRE D'ÉTUDE DE L'ÉNERGIE NUCLÉAIRE

Complex problem solving
Characteristics of a 'complex problem'

example : paying people to test new medicines

interconnection - a related web of problems
'scientific' need for tests / individual need for money

incompatibility - different points of view
risk perception

multidimensionality – in space and time
'direct results' & 'direct money' while possible damage (side effects) may appear later

pluralism of values - no generally accepted standards
added value for the society versus care for the individual

Complex problem solving
‘complex’ → unstructured

unstructured problems : problems where there exists a debate on the scientific facts as well as on the values at stake

	consensus on values	
	no	yes
consensus on scientific ‘facts’		
no	non structured deliberation	moderately structured pacification
yes	moderately structured negotiation	structured regulation

Complex problem solving
‘complex’ → unstructured

unstructured problems : problems where there exists a debate on the scientific facts as well as on the values at stake

	consensus on values	
	no	yes
consensus on scientific ‘facts’		
no	non structured deliberation	moderately structured pacification
yes	moderately structured negotiation	structured regulation

Complex problem solving
‘complex’ → unstructured

unstructured problems : problems where there exists a debate on the scientific facts as well as on the values at stake

	consensus on values: no	consensus on values: yes
consensus on scientific ‘facts’: no	non structured deliberation	moderately structured pacification
consensus on scientific ‘facts’: yes	moderately structured negotiation	structured regulation

Complex problem solving
Gaining insight in ‘values’

Complex problem solving starts with gaining insight in ‘values’ : responsible acting requires knowledge of values : own values and values of the other(s)

This implies the willingness (and the ability) to ‘broaden the perspective’ and to put the issues ‘in context’ instead of defending the own territory and authority.

The context can only be seen if you step out of it and look at it ‘from a distance’:

- ►problem analysis by decoupling ‘the self’ from ‘the professional’ (beyond self-defense)
- ►problem analysis by taking into account sociological and ethical aspects

Transdisciplinarity

Transdisciplinarity as an attitude : problem solving oriented thinking and acting, being ‘curious’ and taking into account that own knowledge is always relative.

Transdisciplinarity as a new approach to research and problem solving : the core idea is that researchers, practioners and stakeholders must cooperate in order to address the complete challenges of society.
[ETHZ Transdisciplinarity conference, 2000]

[…] the transdisciplinary attitude, one which implies putting into practice transcultural, transreligious, transpolitical and transnational visions. […]
[www.unesco.org/education/educprog]

Transdisciplinarity proactive / reactive

Experts in RP should not become experts in philosophy and social sciences :

In the same way as one technology as such cannot be ‘sustainable’, one individual cannot be ‘transdisciplinary’.

A transdisciplinary attitude ‘by definition’ is only possible through interaction.

PISA - Programme of Integration of Social Aspects into nuclear research

PISA is an experiment in second mode science.

Second mode science, precautionary science, post-normal science share the insight that scientific knowledge is, in essence, a social construct, and therefore the attention is directed towards the context(s) of application of scientific knowledge, rather than to its 'truth' in an absolute sense. [Beck (1992), Risk Society]

The monopoly of science on 'truth' is challenged.

Example : traditional scientific approaches to risk assessment face increasing difficulties when applied to the complex (i.e. global, long-term, potentially catastrophic, etc.) problems

PISA
The need to better understand ourselves

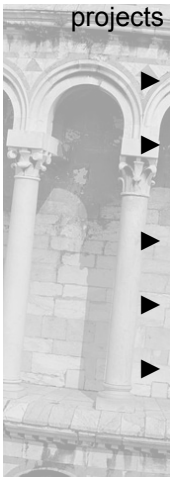
The use of nuclear technological applications in society is a complex problem

- risk, risk management and risk perception
- transgenerational issues
- legal aspects and liability
- interpretation frameworks and values
- expert culture vs social culture

PISA as answer to a (self formulated) 'in-house' need

we wrote :
At present, the nuclear expert is struggling with society, lacking a scientific approach and insight in complex human behavior and societal interaction

PISA
Projects



organised in 5 research tracks

- Sustainability and nuclear development
- Transgenerational ethics and the disposal of radioactive waste
- Legal aspects and liability
- Risk management
- Experts and ethics

PISA
Reflection groups

4 reflection groups

- R1 Ethical choices in radiation protection
- R2 Role and culture of the nuclear expert
- R3 Involvement
- R4 Justification and optimisation

SCK • CEN
STUDIECENTRUM VOOR KERNENERGIE
CENTRE D'ÉTUDE DE L'ENERGIE NUCLÉAIRE

Conclusion

Education and training should start from an attitude of curiosity (of both the teacher and the student)

- taking into account historical lessons
- stating and accepting uncertainties instead of trying to exclude them
- trying to understand social mechanisms, also in the working environment
- trying to broaden the risk scope to ‘multifactorial concerns’ in complex (hazardous) situations

E&T should continuously stimulate the development of a critical sense. This sense is an essential ‘tool’ needed to gain more confidence in the own work and credibility towards the outside world