



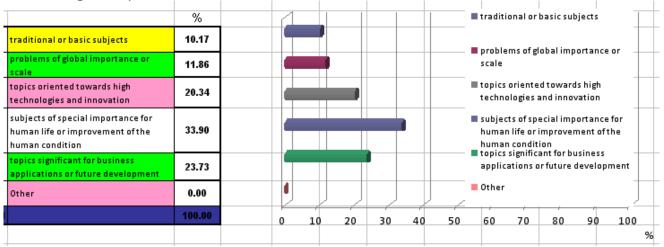
Report on the Results gathered from the Evaluation Questionnaire for Science Teachers (RO)

Number of questioned Science teachers: 35 – lower and upper secondary school Science teachers (Chemistry, Physics and Biology) – May/June 2011. Questionnaire data processed by: Laura Monica GORGHIU and Gabriel GORGHIU (Valahia University Targoviste, Romania) - June/July 2011.

Question no. 1:

• Which kind of topics in Science education would you consider to be more appealing for students?

Results diagram is presented below:



• 33.90% of Science teachers consider that subjects related to special importance for human life or subjects related to the improvement of the human condition are more appealing for students.

• just 10.17% and 11.86% of Science teachers consider that traditional / basic subjects and also problems of global importance or scale are appealing for students.

Question no. 2:

• Which of the extracurricular topics should be integrated with Science topics?





		Strongly agree	Agree	Disagree	Unfilled
2	Optical instruments and how they work	20.00	62.86	5.71	11.43
b	The use of lasers	22.86	60.00	11.43	5.71
c .	How CDs and DVDs store and play sound and image	42.86	31.43	20.00	5.71
	Organic and ecological farming without use of pesticides and artificial fertilizers	54.29	37.14	0.00	8.57
е	How radios and TVs work i	28.57	54.29	11.43	5.71
t 1	How mobile phones can send and receive messages	28.57	31.43	31.43	8.57
g	Life and death and human soul	20.00	51.43	17.14	11.43
h	Why we can see the rainbow	28.57	51.43	11.43	8.57
	The ozone layer and how it may be affected by humans	60.00	34.29	0.00	5.71
	How technology helps us to handle waste, garbage and sewage	57.14	37.14	0.00	5.71
k	How energy can be saved or used in a more effective way	74.29	22.86	0.00	2.86
1	How gene technology prevent diseases	48.57	45.71	2.86	2.86
m	Very recent inventions and discoveries in science and technology	54.29	42.86	0.00	2.86
n	Nanotechnology and its uses	40.00	51.43	5.71	2.86
General		84.69	12.24	3.06	3.06

• 74.29% of Science teachers strongly agree that topics related to how energy can be saved or used in a more effective way should be integrated with Science topics.

• also 60.00% of Science teachers strongly agree that topics related to the ozone layer and how it may be affected by humans should be integrated with Science topics.

• just 20.00% of Science teachers strongly agree that optical instruments and how they work and also life, death and human soul should be integrated with Science topics.

Question no. 3a:

• Do you have any knowledge about Nanotechnology?

Results diagram is presented below:

	Yes	No												
Do you have any knowledge about nanotechnology?	77.14	22.86											Ves	
	% Yes	% No			27	-/	/	/ _/	2	-2	2	\square	2	
				0 1	0 20	30	40	50	60	70	80	90 10	00	

• 77.14% of Science teachers declare they have knowledge about Nanotechnology.

Question no. 3b:

• If yes, which of the curriculum topics are related with Nanotechnology?





		Yes	No	Not sure
а	Chemicals, their properties and how they react	54.29	8.57	37.14
b	Parts of human body and how the systems work	45.71	14.29	40.00
с	Structure of DNA, genetic studies, heredity and how genes influence how we develop reproduction in humans	68.57	2.86	28.57
d	How plants and animals grow and reproduce	20.00	14.29	65.71
e	How people, animals, plants and the environment depend on each other	14.29	20.00	65.71
f	Atom, molecules and chemical bonding	65.71	5.71	28.57
g	Light and its nature	45.71	17.14	37.14
h	Radioactivity and its effects	42.86	5.71	51.43
i	The nature of sound and its properties	28.57	20.00	51.43
j	Velocity and the relationship between velocity, time and road	11.43	20.00	68.57
k	The structure of cell, mitosis and meiosis	40.00	8.57	51.43
1	Simple machines and how they ease our lives	28.57	17.14	54.29
m	Electricity and its properties	37.14	17.14	45.71
n	Optics and how they are used in our daily lives	48.57	11.43	40.00
o	Structure of Earth and how earthquakes happen	5.71	28.57	65.71
р	Clouds, rain and the weather	8.57	22.86	68.57
r	Sustainable energy and its sources	45.71	8.57	45.71
s	Heat and temperature	17.14	20.00	62.86
t	Technology and its interaction with science	57.14	0.00	42.86
	Other	0.00	0.00	0.00
Gener al		36.09	13.83	50.08

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• 68.57% of Science teachers mention that structure of DNA, genetic studies, heredity and how genes influence how we develop reproduction in humans represent a topic suitable for Nanotechnology curricula.

• also 65.71% of Science teachers mention that atom, molecules and chemical bonding represent a topic suitable for Nanotechnology curricula.

• just 5.71% of Science teachers mention that Structure of Earth and how earthquakes happen represent a topic suitable for Nanotechnology curricula.

Question no. 4:

• Which Science topics do you think that should be supported with experiments for a meaningful and permanent learning?





Molecular structures of matter	10.00									1.1	Mole	cular	structu	i ures of	
Heat and temperature	3.33			-							matt Heat		emper	ature	
Electricity	20.00										Elect	ricity	,		
Force and Motion	0.00										Forc	e and l	Motion	1	
Light and Sound	6.67										Light	andS	ound		
Properties of Matter	30.00			-							Prop	erties	ofMat	ter	
Optics	13.33										Opti	cs			
Biology	16.67		0	10	20	30	40	50	60	70	80	90	100		
	100.00														

• 30.00% of Science teachers consider that subjects related to Properties of Matters should be supported with experiments for a meaningful and permanent learning.

• No one of Science teachers consider that subjects related to Force and Motion should be supported with experiments for a meaningful and permanent learning.

Question no. 5:

• Science education should involve the following...

		Strongly agree	Agree	Disagree	Not comple d
а	Make pupils aware of the unlimited aspects of science	65.71	25.71	0.00	8.57
b	Be able to use scientific equipment skillfullv	51.43	42.86	0.00	5.71
с	Be able to demonstrate experiments	65.71	28.57	0.00	5.71
d	Use Information Technology	62.86	34.29	0.00	2.86
e	Expect pupils to use the proper terminology correctly	40.00	45.71	0.00	14.29
f	Link new science learning to everyday experiences	57.14	34.29	0.00	8.57
g	Help pupils to understand the importance of science in modern business applications	34.29	51.43	8.57	5.71
h	Encourage pupils to try out their own ideas in experiments	48.57	37.14	2.86	11.43
i	Teach pupils to understand science concepts	40.00	45.71	0.00	14.29
j	Frequently revise previous learning	31.43	45.71	5.71	17.14
k	Show how classroom learning relates to phenomena in outside world and	60.00	37.14	0.00	2.86
1	Explain to pupils how to use the scientific knowledge and why their	51.43	37.14	0.00	11.43
m	Help pupils become aware of the benefits and misuses of science	48.57	45.71	0.00	5.71
n	Relate each new idea (concept) to ones the pupils have already learnt	37.14	51.43	0.00	11.43
о	Use visits to industry to support	34.29	57.14	0.00	8.57
р	Use field trips to support science learning	37.14	51.43	0.00	11.43
r	Develop a personal interest in science (e.e. find new and exciting scientific	48.57	42.86	0.00	8.57
s	Enable the pupils to integrate with	34.29	57.14	2.86	5.71
t	everyday lives and problems of plobal Raise awareness related to the nanotechnology by introducing short	40.00	40.00	11.43	8.57
	offer short reports on modern	28.57	57.14	5.71	8.57
u	achievements in science at the micro- Other	0.00	0.00	0.00	0.00
GEN.		45.86	43,43	1.86	8.86
GEIV.		45.00		1.00	0.00





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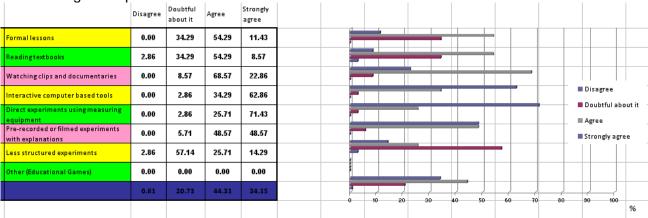
• 65.71% of Science teachers strongly agree that making pupils aware of the unlimited aspects of Science and being able to demonstrate experiments are topics needed to be involved in Science education.

also 62.86% of Science teachers strongly agree that using Information Technology is an • important topic needed to be involved in Science education.

• just 28.57% of Science teachers strongly agree that offering short reports on modern achievements in Science at the micro- and nano-level to be added to every learning unit is an important topic needed to be involved in Science education.

Question no. 6:

The most effective ways to teach a particular scientific topic in a modern way generally • would be...



Results diagram is presented below:

• 71.43% of Science teachers strongly agree that direct experiments using measuring equipment represent a most effective way to teach a particular scientific topic.

 also 62.86% of Science teachers strongly agree that using interactive computer based tools represent a most effective way to teach a particular scientific topic.

• just 8.57% of Science teachers strongly agree that reading text/books represent a most effective way to teach a particular scientific topic.

Question no. 7:

Do you think the following tools are important for an on-line Virtual Lab?





	Disagree	Doubtful about it	Agree	Strongly agree
Texts	0.00	34.29	54.29	11.43
Images	0.00	2.86	48.57	48.57
Video	0.00	0.00	57.14	42.86
Simulations	0.00	2.86	34.29	62.86
Interactive simulations	0.00	2.86	28.57	68.57
Procedures to carry out experiments with the students	0.00	8.57	48.57	42.86
Resource library	0.00	14.29	65.71	20.00
Other	0.00	0.00	0.00	0.00
	0.00	9.39	48.16	42.45

• 68.57% of Science teachers strongly agree that interactive simulations are important for an on-line Virtual Lab.

• also 62.86% of Science teachers strongly agree that simulations are important for an online Virtual Lab.

• just 11.43% of Science teachers strongly agree that texts are important for an on-line Virtual Lab

Question no. 8:

• Which type of Lab approach do you think is better?

Results diagram is presented below:

	Disagree	Doubtful about it	Agree	Strongly agree	Disagree
Cook-book type laboratory activities (step-by step instructions) to verify	0.00	8.57	51.43	40.00	
Inquiry-based laboratory activities (students decide how to conduct the	0.00	17.14	42.86	40.00	and a second sec
	0.00	12.86	47.14	40.00	Strongly agree
					0 10 20 30 40 50 60 70 80 30 100

• 40.00% of Science teachers strongly agree that inquiry-based laboratory activities (where students decide how to conduct the activity, and have to explore in order to figure out how the world works) are the best approach for an on-line Virtual Lab.

• also 40.00% of Science teachers strongly agree that cook-book type laboratory activities (step-by step instructions - to verify scientific facts) represent a proper option for an on-line Virtual Lab.

Question no. 9:

• The appropriate activities in a laboratory would be...





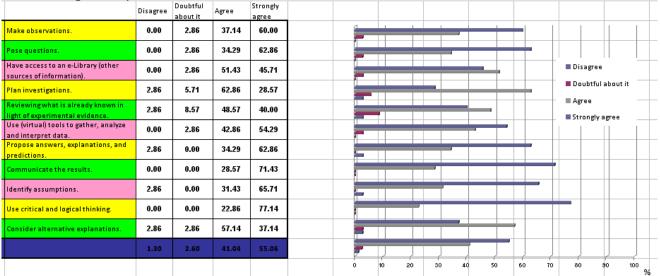
	Disagree	Doubtful about it	Agree	Strongly agree
Students should get involved with scientifically oriented questions.	5.71	42.86	20.00	31.43
Students should have (be provided with) the ability to determine what	2.86	8.57	57.14	31.43
Students should have (be provided with) the ability to formulate their	2.86	2.86	45.71	48.57
Students should have (be provided with) the ability to expand upon their	0.00	0.00	28.57	71.43
Students should have (be provided with) the ability to communicate their	0.00	8.57	42.86	48.57
Students should be able to have access to experiments on-line which	0.00	0.00	42.86	57.14
	1.90	10.48	39.52	48.10

• 71.43% of Science teachers strongly agree that students should have (be provided with) the ability to expand upon their findings and relate those findings to similar situations.

• just 31.43% of Science teachers strongly agree that students should get involved with scientifically oriented questions and should have (be provided with) the ability to determine what data allows them to develop and evaluate scientific explanations.

Question no. 10:

• If you were to create your own laboratory, the students should be able to...



Results diagram is presented below:

• 77.14% of Science teachers strongly agree that students should be able to use critical and logical thinking during lab activities.

• also 71.43% of Science teachers strongly agree that students should be able to communicate the experimental results during lab activities.

• just 28.57% of Science teachers strongly agree that students should be able to plan investigations during lab activities.

Question no. 11:

• How well are you able to manage with using ICT tools for teaching Science topics?





Results diagram is presented below:

i i		alagiani								
	poor	average	good	excelent						
	5.71	42.86	45.71	5.71					•	poor average
	роог	average	good	excellent		0 10 20 30	40 50 60 70	80 90 100		l good excelent

• generally, the results are balanced: 45.71% of Science teachers are good in managing on using ICT tools for teaching Science topics, 42.86% of Science are at medium level in managing on using ICT tools for teaching Science topics.

• at the same time, 5.71% of Science teachers have - on the one hand - poor expertise and on the other hand - excellent expertise in managing on using ICT tools for teaching Science topics.

Question no. 12:

To what extent do you implement ready-made ICT tools for teaching Science topics?

Results	diagram		always	ow:					
0.00	62.86	25.71	11.43						sometimes
never	sometim es	often	always		0	0 10 20 30	40 50 60 70	80 90 100	■ often %■ always

. . . .

 62.86% of Science teachers declare they implement sometimes ready-made ICT tools for teaching Science topics.

Question no. 13:

• What is the purpose of using Nano-Tech experiments in your classroom by the use of ICT?

Results diagram is presented below:

To let students understand the core aspects of the nano-technology To provide students with nano-tech examples	28.13 21.88								t ∎ 1	the core technol fo provi	ogy ide stud	ts of th dents w	e nano-	
To verify hypothesis, theories or models from nano-technology area To raise the students' motivation for earning nano-technology	17.19 32.81								1	Fo verifi or mode	ch exar y hypoti els from ogy are	hesis, t 1 nano-	heories	5
v v	100.00			_4	_2	_{				Fo raise	the stu	udents'	ignano-	-
			0	10	20	30	40	50	60	70	80	90	100	4

• 32.81% of Science teachers declare that raising the students' motivation for learning Nanotechnology represents the purpose of using Nano-Tech experiments in the classroom by the use of ICT.

• just 17.19% of Science teachers declare that verifying hypothesis, theories or models from Nano-technology area represents the purpose of using Nano-Tech experiments in the classroom by the use of ICT.





Question no. 14:

• What kind(s) of ICT tools do you use for presenting Science/Nano-Tech experiments in your lessons?

Results diagram is presented below:

PowerPoint Presentations	28.36							Pres	erPoint sentations tal Images	
Digital Images	13.43							-	o clips	
Video clips	17.91							Virt	ual Experiment	s ,
Virtual Experiments	40.30							🗖 Oth	er	
Other	0.00		0 10	20 3	0 40	50	60	- 70 80	90 100	
	100.00									

• 40.30% of Science teachers intend to use Virtual Experiments for presenting Nano-tech experiments in the lessons.

• just 13.43% of Science teachers intend to use digital images for presenting Nano-tech experiments in the lessons.

Question no. 15:

• Evaluate (on a scale from 1 to 4) how important are ICT tools for you related to the promoting of inquiry based/creative learning about Science/Nano-Tech topics.

not at all	very little	to some	to great
2.86	11.43	51.43	34.29
2.86	11.43	48.57	37.14
2.86	8.57	25.71	62.86
2.86	5.71	51.43	40.00
2.85	9.29	9 29 44 29	43.57
2.00	5125		
	2.86 2.86 2.86	2.86 11.43 2.86 8.57 2.86 5.71	not at all very little 2.86 11.43 51.43 2.86 11.43 48.57 2.86 8.57 25.71 2.86 5.71 51.43

Results diagram is presented below:

• 62.86% of Science teachers appreciate (in a great extent) that ICT tools represent a channel for guiding students to explain scientific aspects and propose hypothesis for investigation, considering the importance of ICT tools to the promoting of inquiry based/creative learning about Science/Nano-Tech topics.

• however, 40.00% of Science teachers appreciate (in a great extent) that ICT tools represent a method to enhance creativity in teaching and learning process, considering the importance of ICT tools to the promoting of inquiry based/creative learning about Science/Nano-Tech topics.

Question no. 16:

• Evaluate (on a scale from 1 to 4) how you consider collaboration using ICT for teaching Science/Nano-Tech topics.





to great to some not at all very little as a method to increase students 2.86 8.57 37.14 51.43 а motivation as a method to make learning content 2.86 77.14 0.00 20.00 b nore attractive (by using virtual not at all as a way to make students more 25.71 51.43 20.00 2.86 emotional (by connecting them) as a method to promote creativity very little 48.57 d 2.86 8.57 40.00 to some extent based on collaborative work to great extent 11.43 37.14 49.29 40 60 ao. 100 50

• 77.14% of Science teachers appreciate (in a great extent) that ICT tools represent a method to make learning content more attractive (by using virtual environments and multimedia tools), considering the role of ICT tools for teaching Science/Nano-Tech topics.

• however, 51.43% of Science teachers appreciate (in a great extent) that ICT tools represent method to increase students' motivation, considering the role of ICT tools for teaching Science/Nano-Tech topics.

Question no. 17:

• Where do you find good examples of Science experiments, appropriate to be presented in the classroom?

From real life	40.68						From real life
From Internet (WWW Space), please specify some sources	37.29						From Internet (WWW Space), please specify some sources
From educational CDs/DVDs, please name some titles:	18.64		-				From educational CDs/DVDs,
They are produced by myself, please provide further details:	3.39	-		J			please name some titles: They are produced by myself,
	100.00	0	10 2	0 30	40	50	60 please provide further details: %

Results diagram is presented below:

• 40.68% of Science teachers use examples from real life for the Nano-Tech experiments (needed to be presented in the classroom).

• however, 37.29% of Science teachers use examples for the Nano-Tech experiments (needed to be presented in the classroom) collected / downloaded from Internet (WWW space) – from various webpages: <u>http://www.chemcollective.org/vlab/vlab.php</u>, <u>http://www.nanotek.nu/</u> and <u>http://nanoyou.eu/</u>.

• just 3.39% of Science teachers use examples for the Nano-Tech experiments (needed to be presented in the classroom) produced by themselves.