NTSE – Nano Technology Science Education

Concept paper for the realization of NTSE's Virtual Lab

Appendix B

Questionnaires Evaluation Reports

6.1 Students

6.2 Teachers

6.3 Prospective teachers

6.1 Evaluation Questionnaire for Students

Report on the Average Results gathered from the Evaluation Questionnaire for Students' in Turkey

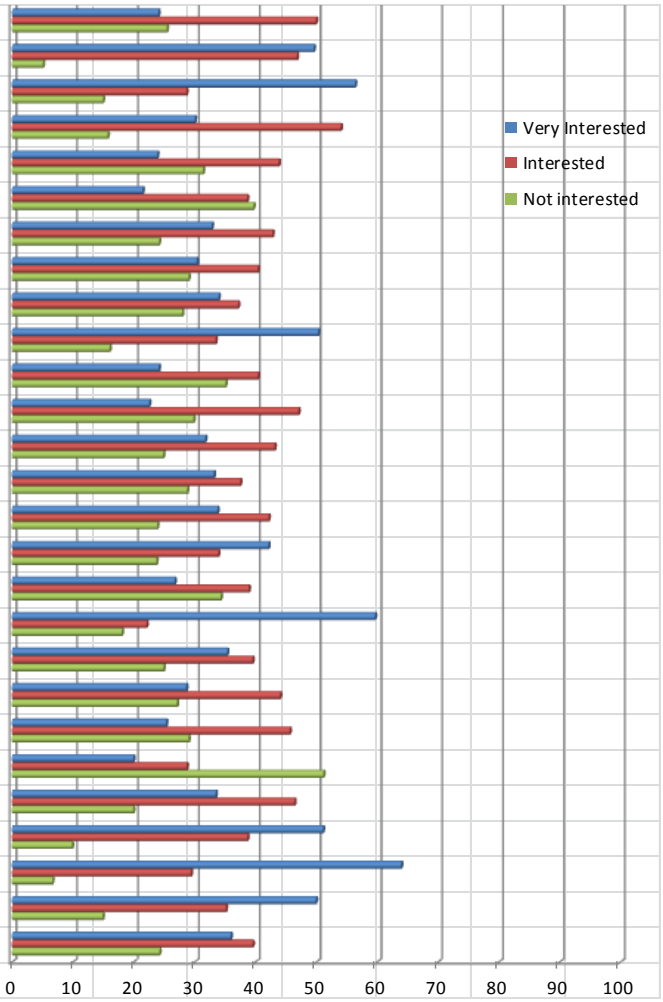
Total Number of questioned students: 256
Questionnaire data processed by: Laura Monica GORGHIU and Gabriel GORGHIU (Private Doga Education Institutions, Turkey)

Question no. 1:

How interested are you in learning about the following in science lessons?

Results diagram is presented below:

a	Chemicals, their properties and how they react	24,06	49,96	25,46
b	Parts of human body and how the systems workr	49,60	46,83	5,09
c	Structure of DNA, genetic studies, heredity and how genes influence how	56,39	28,66	14,95
d	How plants and animals/humans grow and reproduce	30,06	54,04	15,73
e	How living and not living environment are connected on Earth	23,87	43,85	31,41
f	Atom, molecules and chemical bonding	21,47	38,66	39,69
g	Light and its nature	32,85	42,80	24,17
h	The nature of sound and its properties	30,38	40,41	29,04
i	The structure of cell, cell division	33,98	37,18	27,97
j	Robots and automated machines and their use in life	50,31	33,47	16,05
k	Electricity and its properties	24,14	40,42	35,09
l	Optics and how they are used in our daily lives	22,55	47,09	29,84
m	Structure of Earth	31,79	43,17	24,87
n	Weather and climate changes	33,17	37,52	28,79
o	Renewable energy and new energy sources.	33,77	42,18	23,87
p	The use of lasers	42,17	33,92	23,74
q	How radios and TVs work	26,76	38,91	34,33
r	Life and death and human soul	59,66	22,11	18,06
s	Why we can see the rainbow	35,37	39,53	24,92
t	The ozone layer and how it may be affected by humans	28,65	44,06	27,12
u	How technology helps us to handle waste, garbage and sewage	25,33	45,65	29,03
v	Organic and ecological farming without use of pesticides and artificial	19,95	28,71	51,17
w	How energy can be saved or used in a more effective way	33,49	46,41	19,93
x	Technology in healthcare and medicine	51,10	38,69	9,86
y	Latest inventions and discoveries in science	63,96	29,41	6,63
z	Nanotechnology and its' use in life	49,94	35,15	14,90
GEN.		35,95	39,57	24,23
		%Very Interested	% Interested	%not Interested



- The most interesting topics for students are:
    1. Life, death and human soul (%59,66)
    2. Structure of DNA, genetic studies, heredity and how genes influence how we develop (% 56,39)
    3. Technology in healthcare and medicine (% 57,59)
    4. Technology in healthcare and medicine (% 51,10)

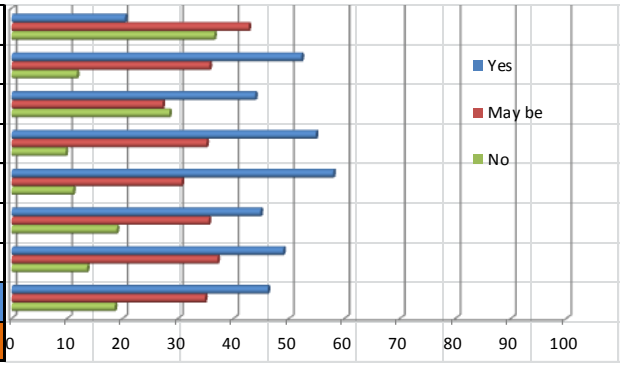
- The less interesting topic for students is organic and ecological farming without use of pesticides and artificial fertilizers (% 51,17)

Question no. 2:

What do you think about science education in school?

Results diagram is presented below:

a	School science is a difficult subject	20,43	42,71	36,52
b	School science has opened my eyes to new careers and new events around	52,24	35,66	11,74
c	I like school science more than most other subjects	43,88	27,19	28,41
d	The things that I learn in science at school will be helpful in my everyday	54,82	35,11	9,73
e	School science has increased my curiosity about things we cannot yet	57,96	30,63	11,06
f	School science has increased my appreciation of nature	44,85	35,50	18,95
g	School science is my way to technology and science knowledge	48,96	37,11	13,59
GEN.		46,16	34,84	18,57
		%Yes	% May Be	% No



- % 57,96 of the students think that school science has increased their curiosity about things we cannot yet explain
- % 54,82 of the students think that the things that they learn in science at school will be helpful in their everyday life
- % 52,24 of the students consider that school science has opened their eyes to new careers and new events around them

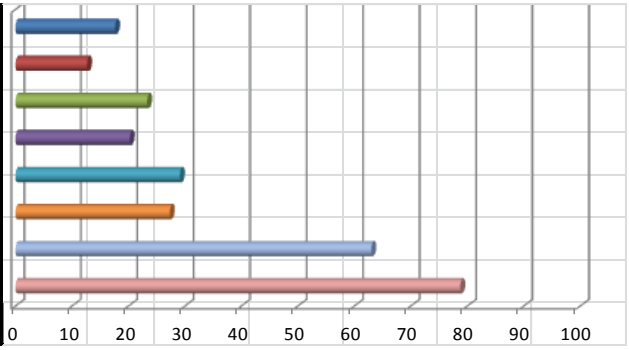
Question no. 3:

I think that a good way to learn more about science and technology is:

(please check if you think it is good)

Results diagram is presented below:

1	Having lessons in the classroom	17,65
2	Reading textbooks	12,68
3	Watching clips and documentaries	23,33
4	Simulated labs and simulated experiments	20,24
5	Real experiments	29,11
6	A guided walk in nature	27,33
7	Other	63,00
GEN.		78,76



- % 63 of the students thinks that other ways are good to learn science. These ways are:
    1. Sample lessons with academicians
    2. making researches about defined topics
    3. outdoor lessons
    4. learning more about the interesting and appealing sides of the topic
    5. playing games / educational games
    6. finding out new innovations and experiences of scientists
    7. learning the lesson in a more effective way to become permanent
    8. visual materials
    9. small trips to professional labs
    10. interviews with scientists and academicians
    11. trips to universities and technological fairs
    12. learning with ICT tools

Question no. 4a:

Do you prefer to use of computers and internet to discover and learn aspects related to Science topics?

Results diagram is presented below:

Do you prefer to use of computers and internet to discover and learn aspects related to Science topics?	84,80	14,68
	% Yes	% No

- % 80 of the students prefer to use computers and internet to discover and learn aspects related to science topics.

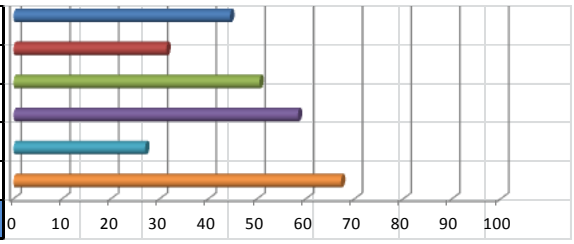
Question no. 4b:

If the answer is "YES",

Indicate what kind of specific tools you would like to use:

Results diagram is presented below:

PowerPoint Presentations	44,42
Images	31,36
Video clips	50,44
Virtual Experiments	58,33
Other	27,00
	67,18



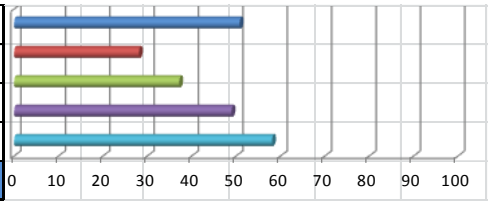
- % 58,33 of the students would like to use virtual experiments.
- % 50,44 of the students would like to use video clips
- % 44,42 of the students would like to use power point presentations

Question no. 5:

Choose which kind of specific environments do you like to use for this purpose:

Results diagram is presented below:

Platform made just for this	50,81
Social Network like facebook with included science materials	28,13
Forum/Group discussion with included science materials	37,22
Other	49,00
	58,13



- % 50,81 of the students would like to use a platform made just for them
- % 49 of the students would like to use other sources like;
    1. Scientific blogs
    2. Twitter
    3. Related web sites

Report on the Results gathered from the Evaluation Questionnaire for Students in Romania

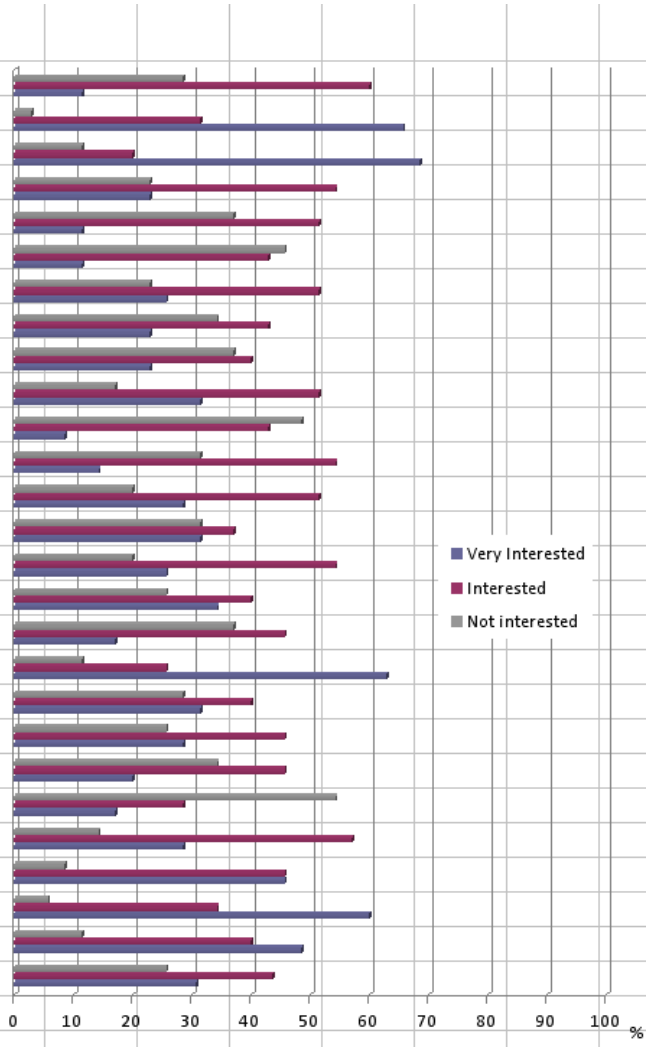
Number of questioned students: 35 - students with advance Sciences knowledge (9th & 10th form) – May/June 2011.
Questionnaire data processed by: Laura Monica GORGHIU and Gabriel GORGHIU (Valahia University Targoviste, Romania) - June/July 2011.

Question no. 1:

- How interested are you in learning about the following topics in Science lessons?

Results diagram is presented below:

		Very Interested	Interested	Not interested
a	Chemicals, their properties and how they react	11.43	60.00	28.57
b	Parts of human body and how the systems workr	65.71	31.43	2.86
c	Structure of DNA, genetic studies, heredity and how genes influence how	68.57	20.00	11.43
d	How plants and animals/humans grow and reproduce	22.86	54.29	22.86
e	How living and not living environment are connected on Earth	11.43	51.43	37.14
f	Atom, molecules and chemical bonding	11.43	42.86	45.71
g	Light and its nature	25.71	51.43	22.86
h	The nature of sound and its properties	22.86	42.86	34.29
i	The structure of cell, cell division	22.86	40.00	37.14
j	Robots and automated machines and their use in life	31.43	51.43	17.14
k	Electricity and its properties	8.57	42.86	48.57
l	Optics and how they are used in our daily lives	14.29	54.29	31.43
m	Structure of Earth	28.57	51.43	20.00
n	Weather and climate changes	31.43	37.14	31.43
o	Renewable energy and new energy sources.	25.71	54.29	20.00
p	The use of lasers	34.29	40.00	25.71
q	How radios and TVs work	17.14	45.71	37.14
r	Life and death and human soul	62.86	25.71	11.43
s	Why we can see the rainbow	31.43	40.00	28.57
t	The ozone layer and how it may be affected by humans	28.57	45.71	25.71
u	How technology helps us to handle waste, garbage and sewage	20.00	45.71	34.29
v	Organic and ecological farming without use of pesticides and artificial	17.14	28.57	54.29
w	How energy can be saved or used in a more effective way	28.57	57.14	14.29
x	Technology in healthcare and medicine	45.71	45.71	8.57
y	Latest inventions and discoveries in science	60.00	34.29	5.71
z	Nanotechnology and its' use in life	48.57	40.00	11.43
GEN.	Total	30.66	43.63	25.71
		% Very Interested	% Interested	% not Interested



The most interesting subjects for students are:

1. Structure of DNA, genetic studies, heredity and how genes influence how we develop – 68.57%
2. Parts of human body and how the systems work – 65.71%
3. Life and death and human soul – 62.86%

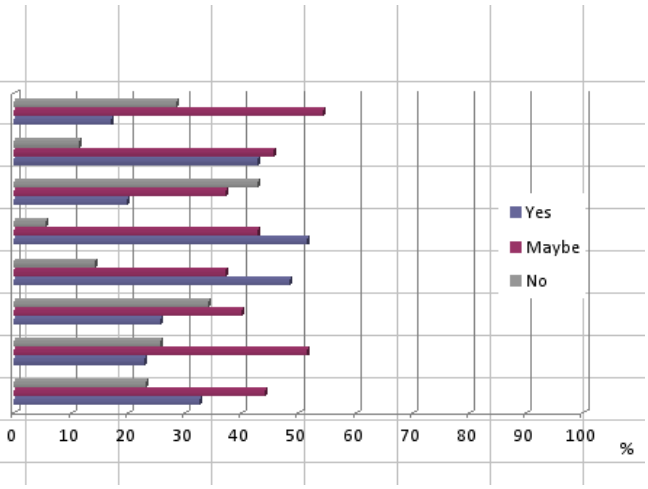
The less interesting subjects for students are:
1. Organic and ecological farming without use of pesticides and artificial fertilizers – 54.29%
2. Electricity and its properties – 48.57%
3. Atom, molecules and chemical bonding – 45.71%

Question no. 2:

- What do you think about Science education in school?

Results diagram is presented below:

		Yes	Maybe	No
a	School science is a difficult subject	17.14	54.29	28.57
b	School science has opened my eyes to new careers and new events around	42.86	45.71	11.43
c	I like school science more than most other subjects	20.00	37.14	42.86
d	The things that I learn in science at school will be helpful in my everyday	51.43	42.86	5.71
e	School science has increased my curiosity about things we cannot yet	48.57	37.14	14.29
f	School science has increased my appreciation of nature	25.71	40.00	34.29
g	School science is my way to technology and science knowledge	22.86	51.43	25.71
GEN.	Total	32.65	44.08	23.27
		%Yes	% May Be	% No



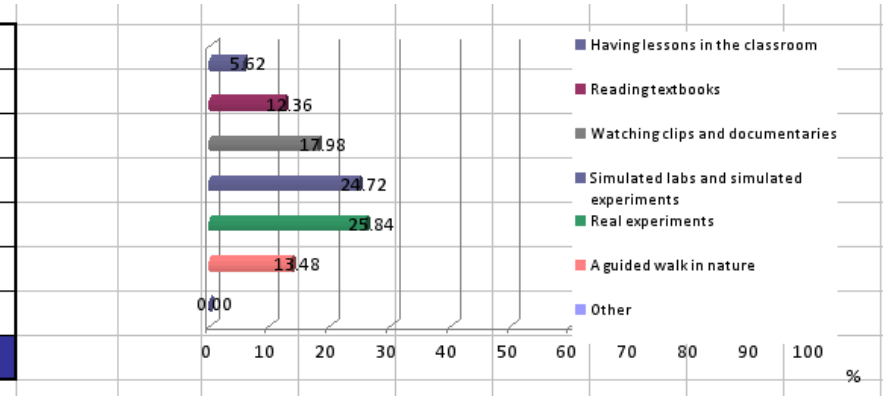
- 51.43% of students consider that things that they learn in Science at school will be helpful in their everyday life.
- 42.86% of students do not like Science topics more than most other subjects.

Question no. 3:

- I think that a good way to learn more about science and technology is…

Results diagram is presented below:

1	Having lessons in the classroom	5.62
2	Reading textbooks	12.36
3	Watching clips and documentaries	17.98
4	Simulated labs and simulated experiments	24.72
5	Real experiments	25.84
6	A guided walk in nature	13.48
7	Other	0.00
GEN.		100.00



- 25.84% of students consider real experiments as the best way for learning about Science and Technology.
- just 5.62% of students appreciate having ordinary lessons in the classroom as a suitable way for learning about Science and Technology.

Question no. 4a:

- Do you prefer to use of computers and Internet to discover and learn aspects related to Science topics?

Results diagram is presented below:

	Yes	No
Do you prefer to use of computers and internet to discover and learn aspects	94.29	5.71
	%Yes	% No

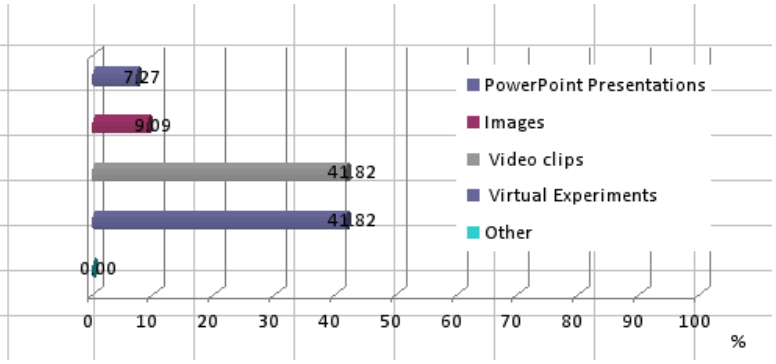
- 94.29% of students prefer to use computers and Internet to discover and learn aspects related to Science topics.
- 5.71% of students do not prefer to use computers and Internet to discover and learn aspects related to Science topics.

Question no. 4b:

- Indicate what kind of specific tools you would like to use to discover and learn aspects related to Science topics.

Results diagram is presented below:

1	PowerPoint Presentations	7.27
2	Images	9.09
3	Video clips	41.82
4	Virtual Experiments	41.82
5	Other	0.00
GEN.		100.00



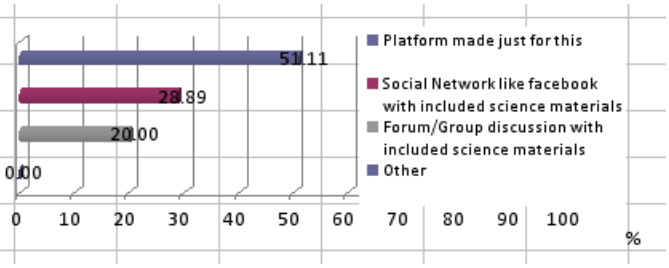
- 41.82% of students would like to use educational video-clips and virtual experiments to discover and learn aspects related to Science topics.
- just 7.27% of students would like to use PowerPoint presentations to discover and learn aspects related to Science topics.

Question no. 5:

- Choose which kind of specific environments do you like to use for discovering and learning aspects related to Science topics.

Results diagram is presented below:

1	Platform made just for this	51.11
2	Social Network like facebook with included science materials	28.89
3	Forum/Group discussion with included science materials	20.00
4	Other	0.00
GEN.		100.00



- 51.11% of students prefer a platform to be used as a support to discover and learn aspects related to Science topics.
- 28.89% of students prefer a social network environment to be used as a support to discover and learn aspects related to Science topics.
- 20.00% of students prefer a forum / group discussion as an environment to be used for discovering and learning aspects related to Science topics.

- **Report on the Results gathered from the Evaluation Questionnaire for Students in Greece**

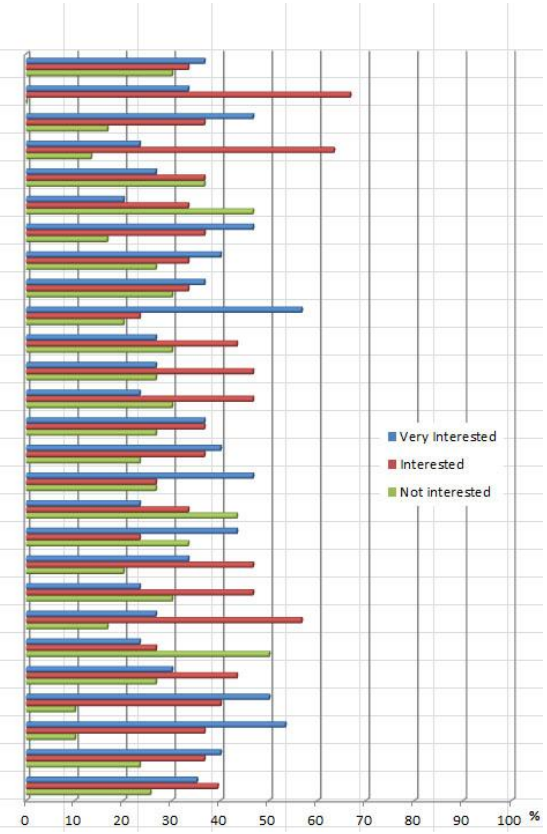
Number of questioned students: **30** - (7^{th} to 10^{th} form) – June 2011.
Questionnaire data processed by: George Androulakis (FORTH / IACM, Greece) – July 2011.

Question no. 1:

- **How interested are you in learning about the following topics in Science lessons?**

Results diagram is presented below:

		Very Interested	Interested	Not interested	Total	Very Interested	Interested	Not interested
a	Chemicals, their properties and how they react	11	10	9	30	36,67	33,33	30,00
b	Parts of human body and how the systems work	10	20	0	30	33,33	66,67	0,00
c	Structure of DNA, genetic studies, heredity and how genes influence how	14	11	5	30	46,67	36,67	16,67
d	How plants and animals/humans grow and reproduce	7	19	4	30	23,33	63,33	13,33
e	How living and not living environment are connected on Earth	8	11	11	30	26,67	36,67	36,67
f	Atom, molecules and chemical bonding	6	10	14	30	20,00	33,33	46,67
g	Light and its nature	14	11	5	30	46,67	36,67	16,67
h	The nature of sound and its properties	12	10	8	30	40,00	33,33	26,67
i	The structure of cell, cell division	11	10	9	30	36,67	33,33	30,00
j	Robots and automated machines and their use in life	17	7	6	30	56,67	23,33	20,00
k	Electricity and its properties	8	13	9	30	26,67	43,33	30,00
l	Optics and how they are used in our daily lives	8	14	8	30	26,67	46,67	26,67
m	Structure of Earth	7	14	9	30	23,33	46,67	30,00
n	Weather and climate changes	11	11	8	30	36,67	36,67	26,67
o	Renewable energy and new energy sources.	12	11	7	30	40,00	36,67	23,33
p	The use of lasers	14	8	8	30	46,67	26,67	26,67
q	How radios and TVs work	7	10	13	30	23,33	33,33	43,33
r	Life and death and human soul	13	7	10	30	43,33	23,33	33,33
s	Why we can see the rainbow	10	14	6	30	33,33	46,67	20,00
t	The ozone layer and how it may be affected by humans	7	14	9	30	23,33	46,67	30,00
u	How technology helps us to handle waste, garbage and sewage	8	17	5	30	26,67	56,67	16,67
v	Organic and ecological farming without use of pesticides and artificial	7	8	15	30	23,33	26,67	50,00
w	How energy can be saved or used in a more effective way	9	13	8	30	30,00	43,33	26,67
x	Technology in healthcare and medicine	15	12	3	30	50,00	40,00	10,00
y	Latest inventions and discoveries in science	16	11	3	30	53,33	36,67	10,00
z	Nanotechnology and its' use in life	12	11	7	30	40,00	36,67	23,33
GEN.	Total	274	307	199	780	35,13	39,36	25,51
						%Very interested	% interested	%not interested



The most interesting subjects for students are:

1. Robots and automated machines and their use– 56.67%
2. Latest inventions and discoveries in science – 53.33%
3. Technology in healthcare and medicine– 50.00%

While 3 more subjects:

1. Structure of DNA, genetic studies, heredity and how genes influence our development
2. Light and its nature
3. The use of lasers

score quite high (46.67%)

Also it's worth mentioning that ALL students are interested in "Parts of the human body and how the systems work" (Very Interested: 33.33%, Interested: 66.67%)

The less interesting subjects for students are:

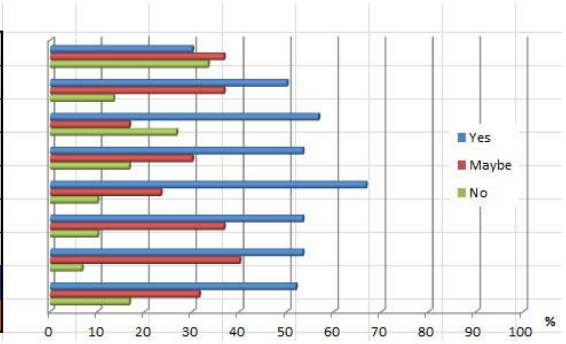
1. Organic and ecological farming without use of pesticides and artificial fertilizers 50.00%
2. Atom, molecules and chemical bonding– 46.67%
3. How radios and TVs work – 43.33%

Question no. 2:

- **What do you think about Science education in school?**

Results diagram is presented below:

		Yes	Maybe	No	Total	Yes	Maybe	No
a	School science is a difficult subject	9	11	10	30	30,00	36,67	33,33
b	School science has opened my eyes to new careers and new events around	15	11	4	30	50,00	36,67	13,33
c	I like school science more than most other subjects	17	5	8	30	56,67	16,67	26,67
d	The things that I learn in science at school will be helpful in my everyday	16	9	5	30	53,33	30,00	16,67
e	School science has increased my curiosity about things we cannot yet	20	7	3	30	66,67	23,33	10,00
f	School science has increased my appreciation of nature	16	11	3	30	53,33	36,67	10,00
g	School science is my way to technology and science knowledge	16	12	2	30	53,33	40,00	6,67
GEN.	Total	109	66	35	210	51,90	31,43	16,67
						%Yes	% May Be	% No



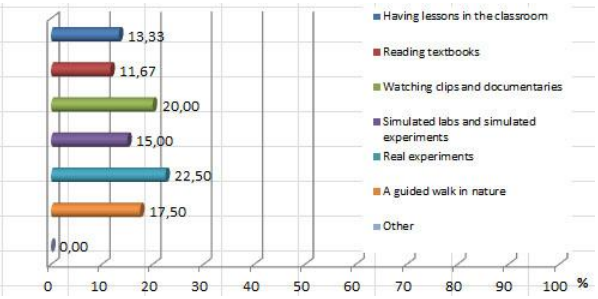
- 2 out of 3 students (66.67%) consider that "School science has increased my curiosity about things we cannot yet explain".
- In general, more than half of the students have a very positive opinion regarding science
- The answers to "School science is a difficult subject" are balanced (Yes-Maybe-No: 30.00-36.67-33.33%)

Question no. 3:

- **I think that a good way to learn more about science and technology is…**

Results diagram is presented below:

1	Having lessons in the classroom	16				13,33
2	Reading textbooks	14				11,67
3	Watching clips and documentaries	24				20,00
4	Simulated labs and simulated experiments	18				15,00
5	Real experiments	27				22,50
6	A guided walk in nature	21				17,50
7	Other	0				0,00
GEN.		120				100,00



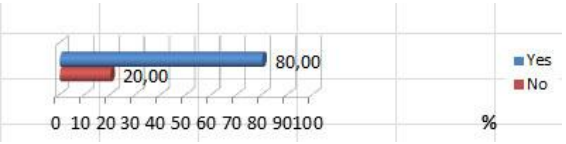
- 22.50% of the students consider real experiments as the best way to learn about Science and Technology while only 11.67% of the students appreciate textbooks as a good way to learn more about science

Question no. 4a:

- **Do you prefer to use computers and the Internet to discover and learn about aspects related to Science topics?**

Results diagram is presented below:

		Yes	No
	Do you prefer to use of computers and internet to discover and learn	80,00	20,00
		%Yes	% No



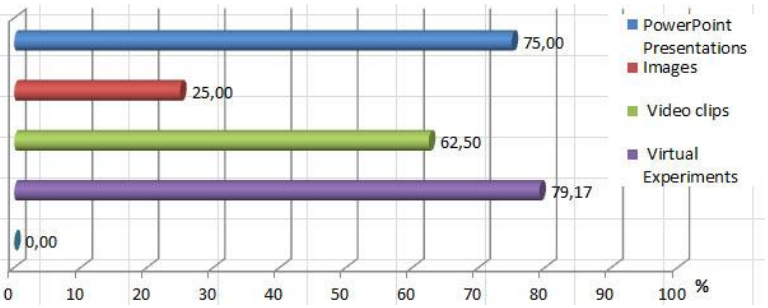
- 4 out of 5 students (80.00) prefer to use computers and the Internet to discover and learn about aspects related to Science topics.

Question no. 4b:

- **Indicate what kind of specific tools you would like to use to discover and learn aspects related to Science topics.**

Results diagram is presented below:

1	PowerPoint Presentations	75,00
2	Images	25,00
3	Video clips	62,50
4	Virtual Experiments	79,17
5	Other	0,00
GEN.		



- 79.17% of students who prefer to use computers and the Internet to discover and learn about aspects related to Science topics would like to use Virtual experiments to do so, while 75.00% of them would like to use Powerpoint. presentations

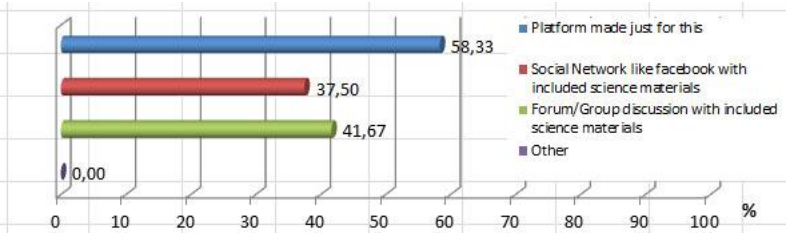
- only 1 out of 4 (25.00%) students would like to use images to discover and learn about aspects related to Science topics.

Question no. 5:

- **Which kind of specific environments do you like to use for discovering and learning about aspects related to Science topics.**

Results diagram is presented below:

1	Platform made just for this	58,33
2	Social Network like facebook with included science materials	37,50
3	Forum/Group discussion with included science materials	41,67
4	Other	0,00
GEN.		



- Regarding the environment they would like to use, the majority of students (58.33%) prefer a platform to be used as a support to discover and learn aspects related to Science topics.
- 41.67% of students prefer a forum / group discussion as an environment to be used for discovering and learning about aspects related to Science topics.
- 37.50% of students prefer a social network environment to be used as a support to discover and learn about aspects related to Science topics.

6.2 Evaluation Questionnaire for Teachers

Report on the Average Results gathered from the Evaluation Questionnaire for Teachers in Turkey

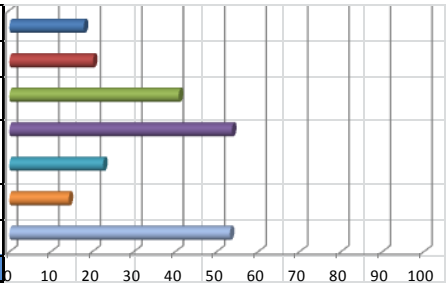
Number of questioned students: 111

Question no. 1:

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

Results diagram is presented below:

1	traditional or basic subjects	17,91
2	problems of global importance or scale	20,15
3	topics oriented towards high technologies and innovation	40,83
4	subjects of special importance for human life or improvement of the human condition	53,68
5	topics significant for business applications or future development	22,58
6	Other	14,29
General		53,17



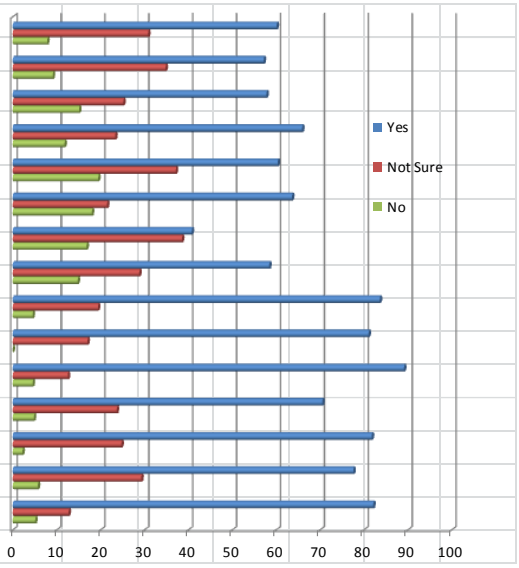
- % 53,68 of the teachers consider that subjects of special importance for human life or improvement of the human condition
- % 40,83 of the teachers consider that topics oriented towards high technologies and innovation.

Question no. 2:

Which of the extracurricular topics should be integrated with science topics?

Results diagram is presented below:

a	Optical instruments and how they work	60,12	30,83	7,86
b	The use of lasers	57,19	34,83	9,12
c	How CDs and DVDs store and play sound and image	57,79	25,19	15,11
d	Organic and ecological farming without use of pesticides and artificial fertilizers	65,94	23,34	11,79
e	How radios and TVs work i	60,36	37,14	19,46
f	How mobile phones can send and receive messages	63,62	21,50	18,04
g	Life and death and human soul	40,79	38,57	16,83
h	Why we can see the rainbow	58,44	28,83	14,81
i	The ozone layer and how it may be affected by humans	83,64	19,42	4,55
j	How technology helps us to handle waste, garbage and sewage	81,06	17,03	#######
k	How energy can be saved or used in a more effective way	89,16	12,56	4,55
l	How gene technology prevent diseases	70,53	23,70	4,81
m	Very recent inventions and discoveries in science and technology	81,80	24,76	2,22
n	Nanotechnology and its uses	77,62	29,29	5,71
General		82,14	12,74	5,12
		% YES	%Not Sure	% No



The most important extracurricular topics that can be integrated with science topics are;

- How energy can be saved or used in a more effective way (% 89,16)
- The ozone layer and how it may be affected by humans (% 83,64)
- Very recent inventions and discoveries in science and technology (% 81,80)
- How technology helps us to handle waste, garbage and sewage (% 81,06)
- Nanotechnology and its uses (% 77,62)
- How gene technology prevent diseases (% 70,53)
- Organic and ecological farming without use of pesticides and artificial fertilizers (% 65,94)
- How mobile phones can send and receive messages (% 63,62)
- How radios and TVs work (% 60,36)
- Optical instruments and how they work (% 60,12)
- Why we can see the rainbow (% 58,44)
- How CDs and DVDs store and play sound and image (% 57,79)
- The use of lasers (% 57,19)

Question no. 3a:

Do you have any knowledge about nanotechnology?

Results diagram is presented below:

Do you have any knowledge about nanotechnology?		Do you have any knowledge about nanotechnology?	80,71	28,93
			% Yes	% No

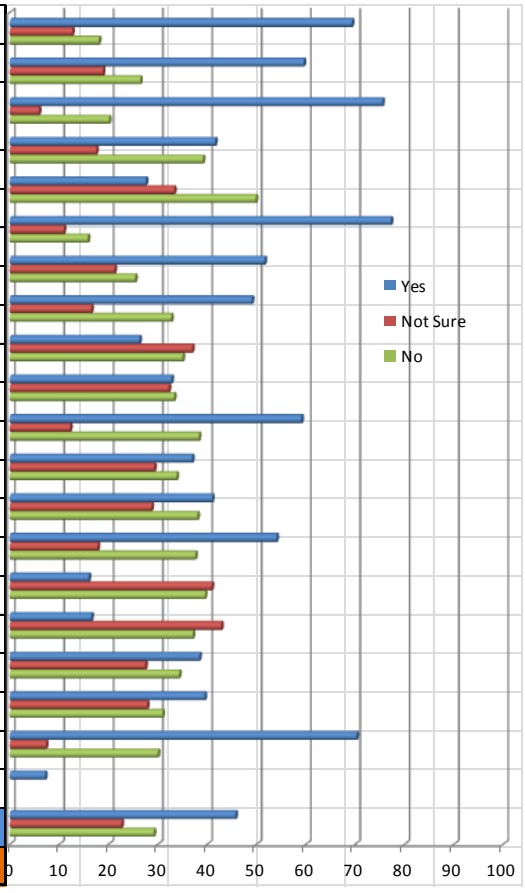
- % 80,71 of the teachers have some knowledge about nanotechnology.

Question no. 3:

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

Results diagram is presented below:

a	Chemicals, their properties and how they react	69,32	12,64	18,04
b	Parts of human body and how the systems work	59,54	18,86	26,43
c	Structure of DNA, genetic studies, heredity and how genes influence how we develop reproduction in humans	75,47	5,90	20,10
d	How plants and animals grow and reproduce	41,60	17,50	39,11
e	How people, animals, plants and the environment depend on each other	27,56	33,29	49,82
f	Atom, molecules and chemical bonding	77,23	10,93	15,79
g	Light and its nature	51,63	21,20	25,39
h	Radioactivity and its effects	49,04	16,48	32,69
i	The nature of sound and its properties	26,25	36,96	35,00
j	Velocity and the relationship between velocity, time and road	32,75	32,20	33,27
k	The structure of cell, mitosis and meiosis	59,08	12,20	38,30
l	Simple machines and how they ease our lives	36,93	29,28	33,80
m	Electricity and its properties	40,99	28,71	38,03
n	Optics and how they are used in our daily lives	54,04	17,77	37,58
o	Structure of Earth and how earthquakes happen	15,99	40,91	39,53
p	Clouds, rain and the weather	16,49	42,85	37,08
r	Sustainable energy and its sources	38,38	27,44	34,31
s	heat and temperature	39,48	27,83	30,91
t	Technology and its interaction with science	70,25	7,33	29,96
	Other	7,14		
General		45,71	22,62	29,18
		% Yes	% Not Sure	% No



Teachers believe that the following topics are related to nanotechnology:

- Atom, molecules and chemical bonding (% 77,23)
- Structure of DNA, genetic studies, heredity and how genes influence how we develop reproduction in humans (% 75,47)

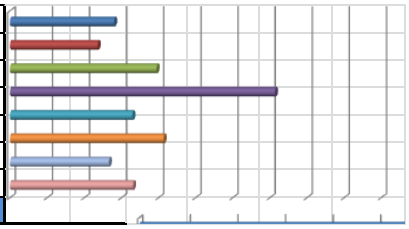
- Technology and its interaction with science (% 70,25)
- Chemicals, their properties and how they react (% 69,32)
- Parts of human body and how the systems work (% 59,54)
- The structure of cell, mitosis and meiosis (% 59,08)
- Optics and how they are used in our daily lives (% 54,04)
- Other : Nanotechnology is the science that controls matter in smallest particles as atoms and molecules. For this reason, it is possible that it can be applied in every scientific area. (% 7,14)

Question no. 4:

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

Results diagram is presented below:

1	Molecular structures of matter	28,10
2	Heat and temperature	23,65
3	Electricity	39,52
4	Force and Motion	71,43
5	Light and Sound	33,02
6	Properties of Matter	41,43
7	Biology	26,67
GEN.		33,16



The teachers believe that the following topics should be supported with experiments:

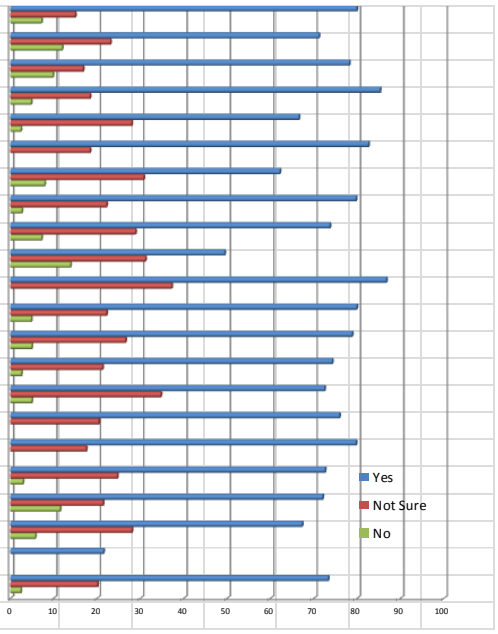
- Force and Motion (% 71,43)
- Properties of Matter (% 41,43)
- Electricity (% 39,52)
- Light and Sound (% 33,02)
- Molecular structures of matter (% 28,09)
- Biology (% 26,67)
- Heat and temperature (% 23,65)

Question no. 5:

Science education should involve the following;

Results diagram is presented below:

a	Make pupils aware of the unlimited aspects of science	79,84	14,92	7,14
b	Be able to use scientific equipment skillfully	71,11	23,02	11,90
c	Be able to demonstrate experiments	78,12	16,72	9,76
d	Bilgi teknolojilerini kullanma	85,24	18,33	4,76
e	Expect pupils to use the proper terminology correctly	66,51	27,94	2,38
f	Link new science learning to everyday experiences	82,54	18,33	
g	Help pupils to understand the importance of science in modern	62,13	30,73	7,86
h	Encourage pupils to try out their own ideas in experiments	79,68	22,14	2,62
i	Teach pupils to understand science concepts	73,65	28,81	7,14
j	Frequently revise previous learning	49,37	31,11	13,81
k	Show how classroom learning relates to phenomena in outside world and	86,67	37,14	
l	Explain to pupils how to use the scientific knowledge and why their	79,84	22,14	4,76
m	Help pupils become aware of the benefits and misuses of science	78,79	26,52	4,88
n	Relate each new idea (concept) to ones the pupils have already learnt	74,17	21,19	2,50
o	Use visits to industry to support science learning	72,40	34,67	4,88
p	Use field trips to support science learning	75,85	20,34	
r	Develop a personal interest in science (e.g. find new and exciting scientific	79,68	17,46	
s	Enable the pupils to integrate with everyday lives and problems of global	72,54	24,60	2,86
t	Raise awareness related to the nanotechnology by introducing short	71,99	21,35	11,43
u	Offer short reports on modern achievements in science at the micro-	67,26	27,98	5,71
	Other	21,43		
GEN.		73,29	20,04	2,36
		% Yes	% Not Sure	% No



Teachers consider that science education should involve the following:

- Show how classroom learning relates to phenomena in outside world and everyday life (% 86,67)
- Use the information technologies (% 85,24)
- Link new science learning to everyday experiences (% 82,54)
- Explain to pupils how to use the scientific knowledge and why their science activity is important (% 79,84)
- Make pupils aware of the unlimited aspects of science (% 79,84)
- Encourage pupils to try out their own ideas in experiments (% 79,68)
- Develop a personal interest in science (e.g. find new and exciting scientific topics to enrich their understanding of new horizons) (% 79,68)
- Help pupils become aware of the benefits and misuses of science (% 78,79)
- Be able to demonstrate experiments (% 78,12)
- Use field trips to support science learning (% 75,85)
- Relate each new idea (concept) to ones the pupils have already learnt (% 74,17)
- Teach pupils to understand science concepts (% 73,65)
- Enable the pupils to integrate with everyday lives and problems of global importance, scientific/technological achievements (% 72,54)

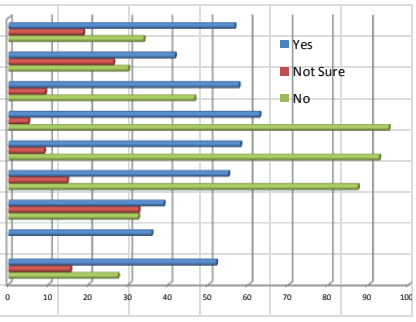
- Use visits to industry to support science learning (% 72,40)
- Raise awareness related to the nanotechnology by introducing short talks at the last 10 minutes of learning unit (% 71,99)
- Be able to use scientific equipment skillfully (% 71,11)
- Offer short reports on modern achievements in science at the micro- and nano-level to be added to every (% 67,26)
- Expect pupils to use the proper terminology correctly (% 66,51)
- Expect pupils to use the proper terminology correctly (% 64,29)
- Help pupils to understand the importance of science in modern business applications (% 62,13)
- Other: “The analytical way of thinking should be developed by brain storms, they shouldn't be criticized, directed and enjoined what you think is wright. "Scientific studies runs through freedom." (%21,43)

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:

1	Formal lessons	56,43	18,69	33,75
2	Reading textbooks	41,55	26,19	29,88
3	Watching clips and documentaries	57,46	9,21	46,43
4	Interactive computer based tools	62,66	5,00	94,87
5	Direct experiments using measuring equipment	57,86	8,93	92,50
6	Pre-recorded or filmed experiments with explanations	54,85	14,66	87,18
7	Less structured experiments	38,73	32,54	32,38
8	Other (Educational Games)	35,71		
GEN.		51,83	15,47	27,34
		%Yes	% Not Sure	% No



- % 62,66 of the teachers consider that interactive computer based tools are the most effective way to teach a particular scientific topic in a modern way.
- % 57,86 of the teachers consider that direct experiments using measuring equipment are the most effective way to teach a particular scientific topic in a modern way.
- % 57,46 of the teachers consider that watching clips and documentaries are the most effective way to teach a particular scientific topic in a modern way.
- % 56,43 of the teachers believe that formal lessons are the most effective way to teach a particular scientific topic in a modern way.

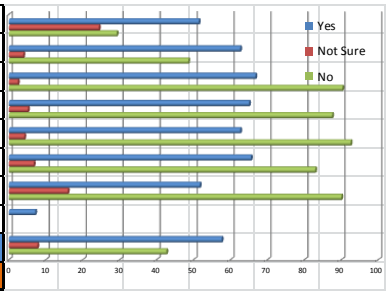
- % 54,85 of the teachers consider that pre-recorded or filmed experiments with explanations are the most effective way to teach a particular scientific topic in a modern way.
- Others (% 35,71) : Study visits to laboratories and institutions which are implementing scientific experiments, all of these ways should be supported by ethic, empathetic and modern teachers, hands-on activities, implementing educational games and inside and outside classroom activities, students should work in groups collaboratively.

Question no. 7:

Do you think the following tools are important for an online virtual lab?

Results diagram is presented below:

1	Texts	51,41	24,38	29,18
2	Images	62,62	3,93	48,57
3	Video	66,72	2,44	90,24
4	Simulations	65,00	5,18	87,50
5	Interactive simulations	62,62	4,17	92,50
6	Procedures to carry out experiments with the students	65,49	6,72	82,93
7	Resource library	51,67	15,95	90,00
8	Other	7,14		
GEN.		57,60	7,73	42,64
		%Yes	% Not Sure	% No



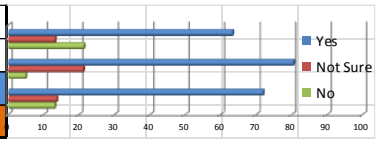
- % 66,72 of the teachers believe that videos are important for an online virtual lab
- % 65,49 of the teachers believe that procedures to carry out experiments with the students are important
- % 65,00 of the teachers believe that simulations are important.
- % 62,62 of the teachers believe that interactive simulations are important while another % 62,62 believe that images are important.
- % 51,67 of the teachers believe that resource library is important for an online virtual lab
- % 51,41of the teachers believe that texts is important for an online virtual lab
- Other: For the blinds and the students who have auditory intelligence the directions of the virtual lab should be audible (% 7,14)

Question no. 8:

Which type of lab approach do you think is better?

Results diagram is presented below:

1	Cook-book type laboratory activities (step-by step instructions) to verify	63,18	13,13	21,24
2	Inquiry-based laboratory activities (students decide how to conduct the	80,36	21,07	4,82
GEN.		71,77	13,59	13,03
		% Yes	% Not Sure	% No



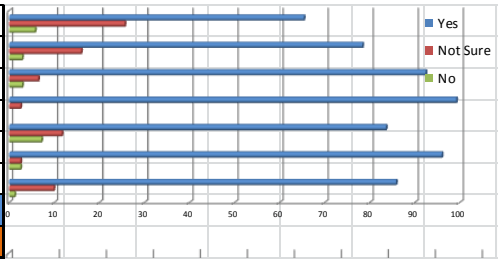
- % 80,36 of the teachers consider that inquiry-based laboratory activities (students decide how to conduct the activity, and have to explore in order to figure out how the world works) are better.
- % 63,18 of the teachers consider that Cook-book type laboratory activities (step-by step instructions) to verify scientific facts are better.

Question no. 9:

The appropriate activities in a laboratory would be;

Results diagram is presented below:

1	Students should get involved with scientifically oriented questions.	65,36	25,60	5,71
2	Students should have (be provided with) the ability to determine what	78,33	15,95	2,86
3	Students should have (be provided with) the ability to formulate their	92,38	6,43	2,86
4	Students should have (be provided with) the ability to expand upon their	99,17	2,50	
5	Students should have (be provided with) the ability to communicate their	83,57	11,67	7,14
6	Students should be able to have access to experiments on-line which	95,95	2,50	2,50
GEN .		85,79	9,86	1,17
		% Yes	%Not Sure	% No



Teachers believe that the appropriate activities in a laboratory would be;

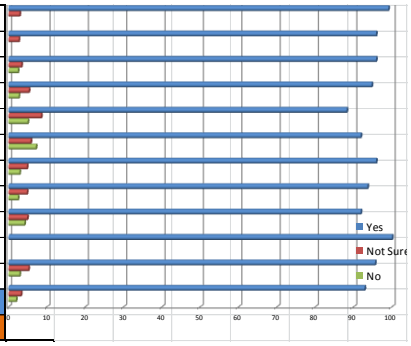
- Students should have (be provided with) the ability to expand upon their findings and relate those findings to similar situations. (% 99,17)
- Students should be able to have access to experiments on-line which cannot be done in a laboratory (% 95,95)
- Students should have (be provided with) the ability to formulate their own explanations from the evidence they have obtained.. (% 92,38)
- Students should have (be provided with) the ability to communicate their experimental findings to others in class via written laboratory reports. (% 83,57)
- Students should have (be provided with) the ability to determine what data allows them to develop and evaluate scientific explanations. (% 78,33)
- Students should get involved with scientifically oriented questions. (% 65,36)

Question no. 10:

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

Results diagram is presented below:

1	Make observations.	99,05	2,86	
2	Pose questions.	95,85	2,65	
3	Have access to an e-Library (other sources of information).	95,85	3,33	2,44
4	Plan investigations.	94,70	5,30	2,65
5	Reviewing what is already known in light of experimental evidence.	88,18	8,49	5,00
6	Use (virtual) tools to gather, analyze and interpret data.	91,85	5,77	7,14
7	Propose answers, explanations, and predictions.	95,85	4,79	2,86
8	Communicate the results.	93,61	4,79	2,44
9	Identify assumptions.	91,85	4,88	4,15
10	Use critical and logical thinking.	100,00		
11	Consider alternative explanations.	95,60	5,18	2,86
GEN.		92,86	3,25	1,95
		% Yes	% Not Sure	% No



The teachers consider that if they were to create their own laboratory, the students should be able to:

- Use critical and logical thinking. (% 100)
- Make observations. (% 99,05)
- Pose questions. (% 95,85)
- Have access to an e-Library (other sources of information). (% 95,85)
- Propose answers, explanations, and predictions. (% 95,85)
- Consider alternative explanations. (% 95,60)
- Plan investigations. (% 94,70)
- Communicate the results. (% 93,61)
- Use (virtual) tools to gather, analyse and interpret data. (% 91,85)
- Identify assumptions. (% 91,85)
- Reviewing what is already known in light of experimental evidence. (% 88,18)

Question no. 11:

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

Results diagram is presented below:

5,28	31,09	54,59	20,71
poor	average	good	excellent

- % 20,71 of the teachers consider themselves excellent ICT tool users for teaching science topics

- % 64,69 of the teachers consider themselves good ICT tool users for teaching science topics

Question no. 12:

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

Results diagram is presented below:

18,78	40,01	40,60	20,00
never	sometimes	often	always

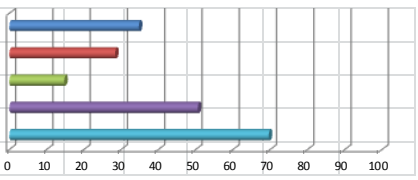
- % 20 of the teachers always implements ready-made ICT tools for teaching science topics
- % 40,80 of the teachers implements ready-made ICT tools for teaching science topics often.
- % 40,01 of the teachers implements ready-made ICT tools for teaching science topics sometimes
- % 18,78 of the teachers implements ready-made ICT tools for teaching science topics never.

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:

1	To let students understand the core aspects of the nano-technology	34,74
2	To provide students with nano-tech examples	28,37
3	To verify hypothesis, theories or models from nano-technology area	14,73
4	To raise the students' motivation for learning nano-technology	50,55
GEN.		69,60



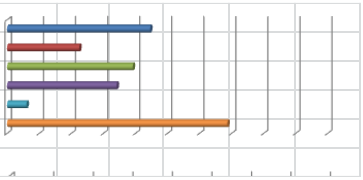
- % 50,55 of the teachers believes that the purpose of using Nano-Tech experiments in the classroom by the use of ICT is to raise the students' motivation for learning nano-technology

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:

1	PowerPoint Presentations	44,63
2	Digital Images	22,51
3	Video clips	39,21
4	Virtual Experiments	34,18
5	Other	6,07
GEN.		68,71



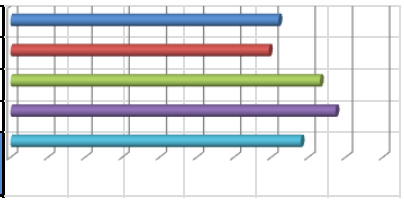
- % 44,63 of the teachers use powerpoint presentations for presenting science/nanotech experiments in their lessons.

Question no. 15:

Evaluate (on a scale from 1 to 3) how important are ICT tools to you for the purpose of promoting an inquiry based/creative learning environment in Science teaching?

Results diagram is presented below:

a	as a method to explain the "Inquiry Based Science Education" concept	71,98
b	as a way for better planning of an experiment	69,40
c	as a channel for guiding students to explain scientific aspects and propose	83,15
d	as a method to enhance creativity in teaching and learning process	87,32
GEN.		77,96



The importance of ICT tools for the purpose of promoting an inquiry based / creative learning environment in science teaching:

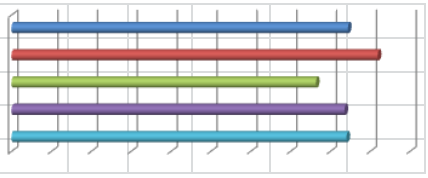
- as a method to enhance creativity in teaching and learning process (% 87,32)
- as a channel for guiding students to explain scientific aspects and propose hypothesis for investigation (% 83,15)
- as a method to explain the "Inquiry Based Science Education" concept (% 71,98)
- as a way for better planning of an experiment (% 69,40)

Question no. 16:

Evaluate (on a scale from 1 to 3) how do you consider collaboration using ICT for teaching Science/Nano-Tech topics?

Results diagram is presented below:

a	as a method to increase students' motivation	84,45
b	as a method to make learning content more attractive (by using virtual	91,94
c	as a way to make students more emotional (by connecting them)	76,42
d	as a method to promote creativity based on collaborative work	83,58
GEN.		84,10



The teachers consider collaboration using ICT for teaching science/nanotech topics:

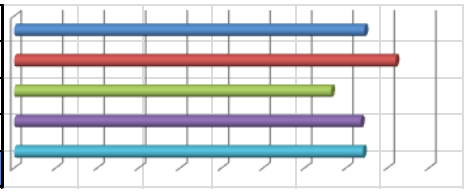
- as a method to make learning content more attractive (by using virtual environments and multimedia tools) (% 91,94)
- as a method to increase students' motivation (% 84,45)
- as a method to promote creativity based on collaborative work (% 83,58)
- as a way to make students more emotional (by connecting them) (% 76,42)

Question no. 17:

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

Results diagram is presented below:

1	From real life	47,47
2	From Internet (WWW Space), please specify some sources	50,30
3	From educational CDs/DVDs, please name some titles:	31,76
4	They are produced by myself, please provide further details:	9,40
GEN.		72,23



The teachers find good examples of experiments to be used in the classroom from:

- From the internet (% 50,30)
- From real life (% 47,47)
- From educational CDs/DVDs (% 31,76)
- They are produced by myself (% 9,40)

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

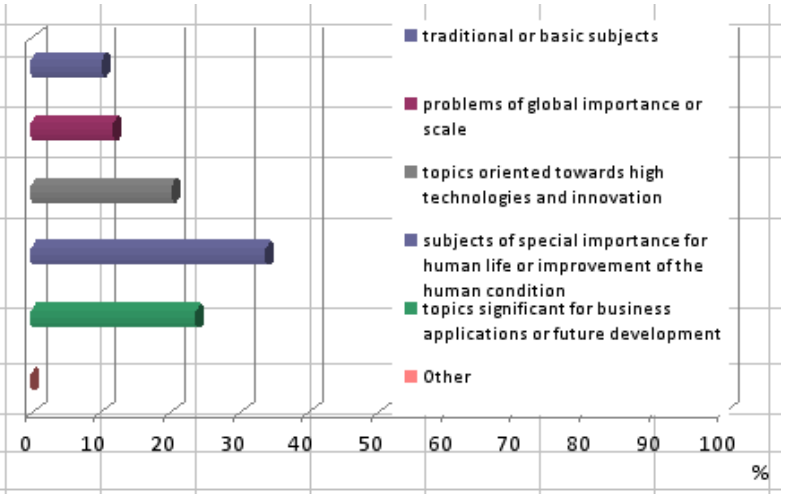
Number of questioned Science teachers: 35 – lower and upper secondary school Science teachers (Chemistry, Physics and Biology) – May/June 2011.
Questionnaire data processed by: Laura Monica GORGHIU and Gabriel GORGHIU (Valahia University Targoviste, Romania) - June/July 2011.

Question no. 1:

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

Results diagram is presented below:

	%
traditional or basic subjects	10.17
problems of global importance or scale	11.86
topics oriented towards high technologies and innovation	20.34
subjects of special importance for human life or improvement of the human condition	33.90
topics significant for business applications or future development	23.73
Other	0.00
	100.00



- 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.

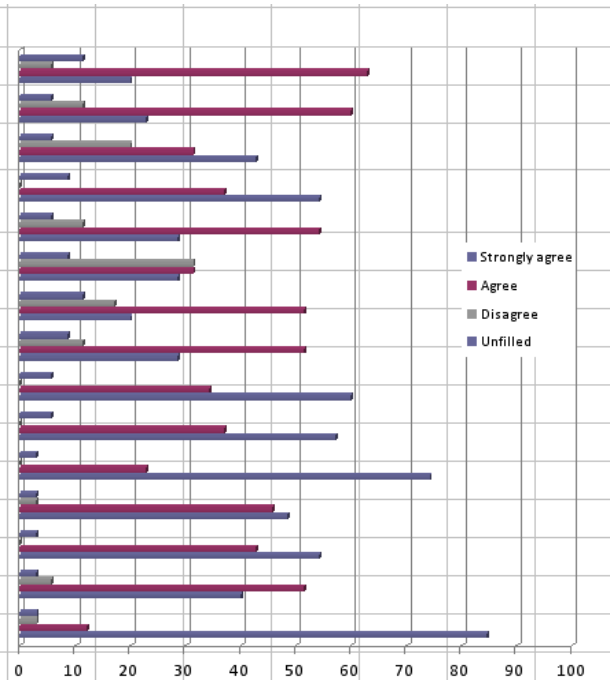
- just 10.17% and 11.86% of Science teachers consider that traditional / basic subjects and also problems of global importance or scale are appealing for students.

Question no. 2:

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

Results diagram is presented below:

		Strongly agree	Agree	Disagree	Unfilled
a	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
d	Organic and ecological farming without use of pesticides and artificial fertilizers	54.29	37.14	0.00	8.57
e	How radios and TVs work i	28.57	54.29	11.43	5.71
f	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
i	The ozone layer and how it may be affected by humans	60.00	34.29	0.00	5.71
j	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
l	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



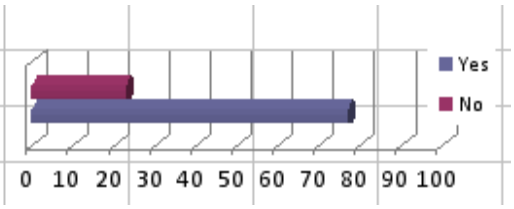
- 74.29% of Science teachers strongly agree that topics related to how energy can be saved or used in a more effective way should be integrated with Science topics.
- also 60.00% of Science teachers strongly agree that topics related to the ozone layer and how it may be affected by humans should be integrated 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
	% Yes	% No



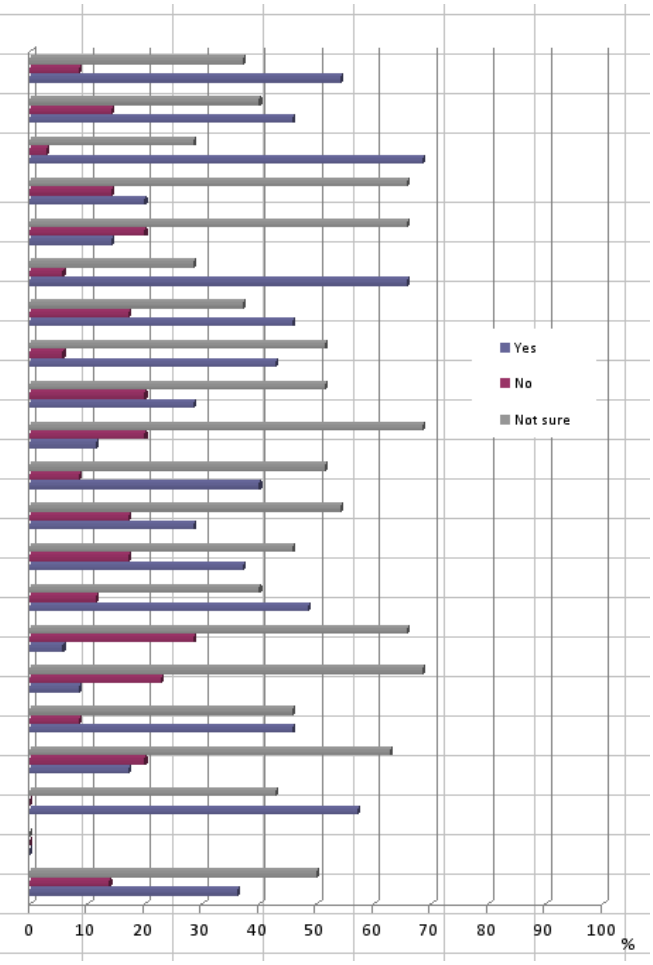
- 77.14% of Science teachers declare they have knowledge about Nanotechnology.

Question no. 3b:

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

Results diagram is presented below:

		Yes	No	Not sure
a	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
c	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
l	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
p	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
General		36.09	13.83	50.08



- 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.

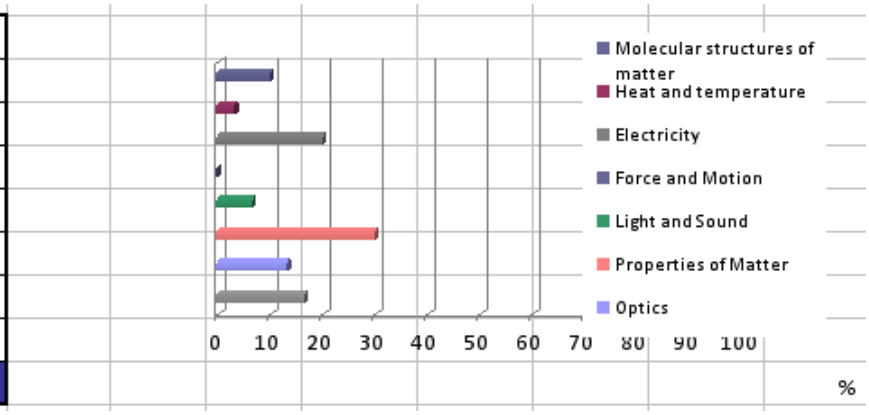
- just 5.71% of Science teachers mention that Structure of Earth and how earthquakes happen represent a topic suitable for Nanotechnology curricula.

Question no. 4:

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

Results diagram is presented below:

Molecular structures of matter	10.00
Heat and temperature	3.33
Electricity	20.00
Force and Motion	0.00
Light and Sound	6.67
Properties of Matter	30.00
Optics	13.33
Biology	16.67
	100.00



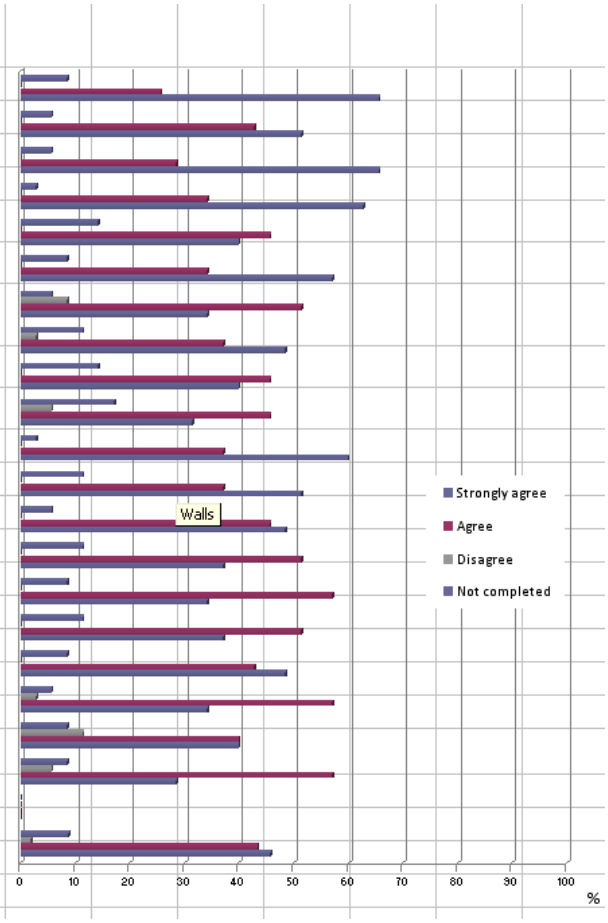
- 30.00% of Science teachers consider that subjects related to Properties of Matters should be supported with experiments for a meaningful and permanent learning.
- No one of Science teachers consider that subjects related to Force and Motion should be supported with experiments for a meaningful and permanent learning.

Question no. 5:

- Science education should involve the following…

Results diagram is presented below:

		Strongly agree	Agree	Disagree	Not completed
a	Make pupils aware of the unlimited aspects of science	65.71	25.71	0.00	8.57
b	Be able to use scientific equipment skillfully	51.43	42.86	0.00	5.71
c	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
l	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
o	Use visits to industry to support science learning	34.29	57.14	0.00	8.57
p	Use field trips to support science learning	37.14	51.43	0.00	11.43
r	Develop a personal interest in science (e.g. find new and exciting scientific	48.57	42.86	0.00	8.57
s	Enable the pupils to integrate with everyday lives and problems of global	34.29	57.14	2.86	5.71
t	Raise awareness related to the nanotechnology by introducing short talks at the last 10 minutes of learning	40.00	40.00	11.43	8.57
u	Offer short reports on modern achievements in science at the micro-	28.57	57.14	5.71	8.57
	Other	0.00	0.00	0.00	0.00
GEN.		45.86	43.43	1.86	8.86



- 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.

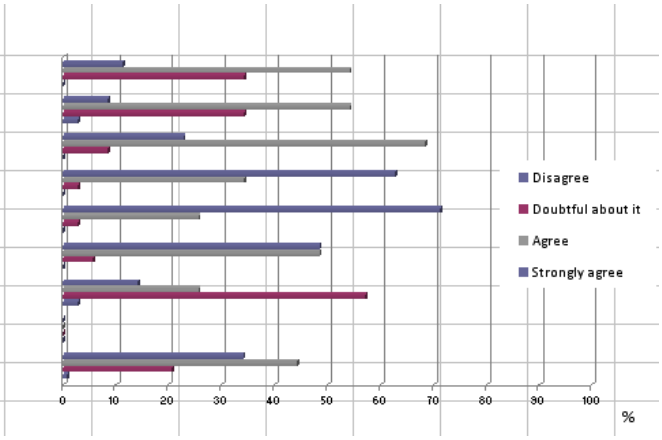
- just 28.57% of Science teachers strongly agree that *offering short reports on modern achievements in Science at the micro- and nano-level to be added to every learning unit* is an important topic needed to be involved in Science education.

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:

	Disagree	Doubtful about it	Agree	Strongly agree
Formal lessons	0.00	34.29	54.29	11.43
Reading textbooks	2.86	34.29	54.29	8.57
Watching clips and documentaries	0.00	8.57	68.57	22.86
Interactive computer based tools	0.00	2.86	34.29	62.86
Direct experiments using measuring equipment	0.00	2.86	25.71	71.43
Pre-recorded or filmed experiments with explanations	0.00	5.71	48.57	48.57
Less structured experiments	2.86	57.14	25.71	14.29
Other (Educational Games)	0.00	0.00	0.00	0.00
	0.81	20.73	44.31	34.15



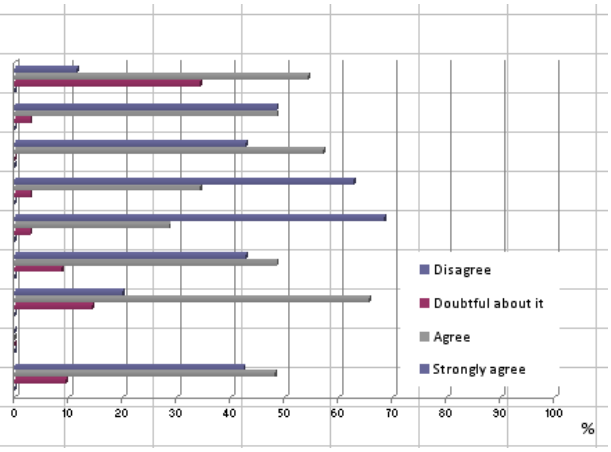
- 71.43% of Science teachers strongly agree that *direct experiments using measuring equipment* represent a most effective way to teach a particular scientific topic.
- also 62.86% of Science teachers strongly agree that using *interactive computer based tools* represent a most effective way to teach 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?

Results diagram is presented below:

	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



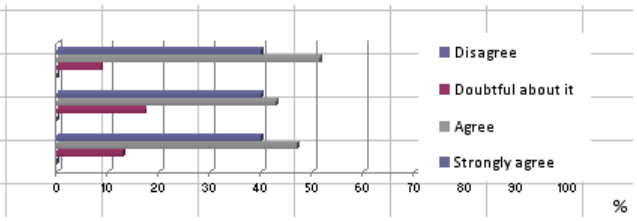
- 68.57% of Science teachers strongly agree that interactive simulations are important for an on-line Virtual Lab.
- also 62.86% of Science teachers strongly agree that simulations are important for an on-line Virtual Lab.
- just 11.43% of Science teachers strongly agree that texts are important for 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
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
	0.00	12.86	47.14	40.00



- 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.

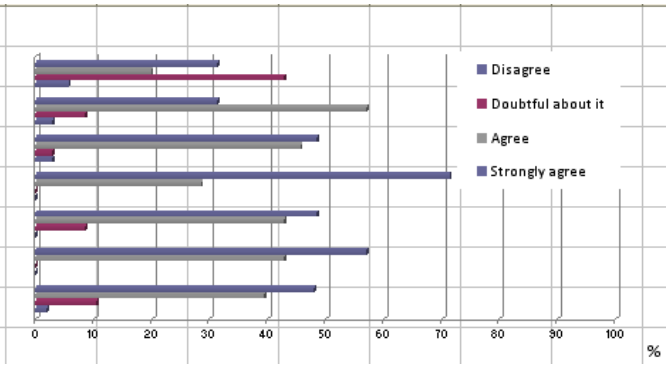
- also 40.00% of Science teachers strongly agree that cook-book type laboratory activities (step-by step instructions - to verify scientific facts) represent a proper option for an on-line Virtual Lab.

Question no. 9:

- The appropriate activities in a laboratory would be…

Results diagram is presented below:

	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.

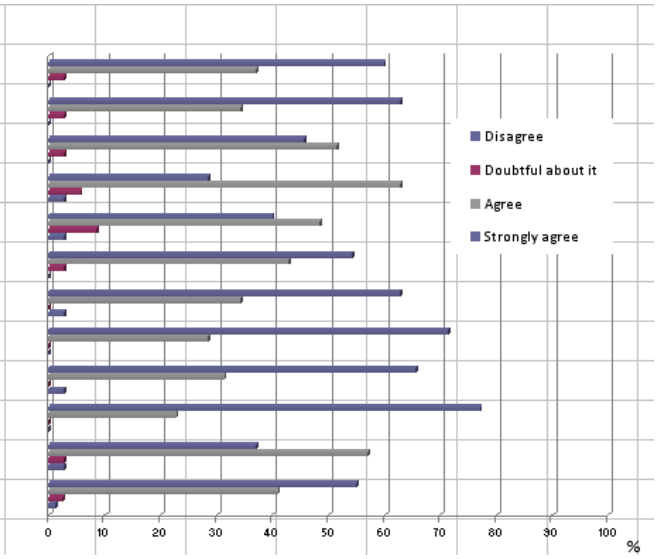
- just 31.43% of Science teachers strongly agree that students should get involved with scientifically oriented questions and should have (be provided with) the ability to determine what data allows them to develop and evaluate scientific explanations.

Question no. 10:

- If you were to create your own laboratory, the students should be able to…

Results diagram is presented below:

	Disagree	Doubtful about it	Agree	Strongly agree
Make observations.	0.00	2.86	37.14	60.00
Pose questions.	0.00	2.86	34.29	62.86
Have access to an e-Library (other sources of information).	0.00	2.86	51.43	45.71
Plan investigations.	2.86	5.71	62.86	28.57
Reviewing what is already known in light of experimental evidence.	2.86	8.57	48.57	40.00
Use (virtual) tools to gather, analyze and interpret data.	0.00	2.86	42.86	54.29
Propose answers, explanations, and predictions.	2.86	0.00	34.29	62.86
Communicate the results.	0.00	0.00	28.57	71.43
Identify assumptions.	2.86	0.00	31.43	65.71
Use critical and logical thinking.	0.00	0.00	22.86	77.14
Consider alternative explanations.	2.86	2.86	57.14	37.14
	1.30	2.60	41.04	55.06



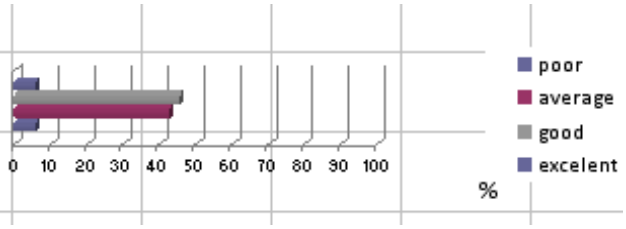
- 77.14% of Science teachers strongly agree that students should be able to use critical and logical thinking during lab activities.
- also 71.43% of Science teachers strongly agree that students should be able to communicate the experimental results during lab activities.
- just 28.57% of Science teachers 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:

poor	average	good	excelent
5.71	42.86	45.71	5.71
poor	average	good	excellent



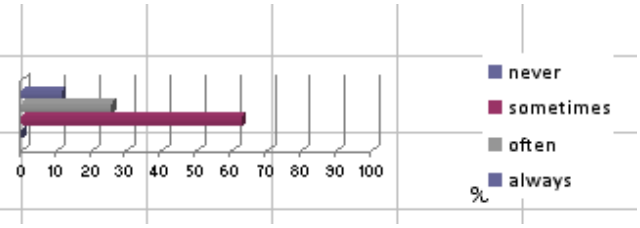
- generally, the results are balanced: 45.71% of Science teachers are good in managing on using ICT tools for teaching Science topics, 42.86% of Science are at medium level in managing on using ICT tools for teaching Science topics.
- at the same time, 5.71% of Science teachers have - on the one hand - 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 is presented below:

never	sometimes	often	always
0.00	62.86	25.71	11.43
never	sometimes	often	always



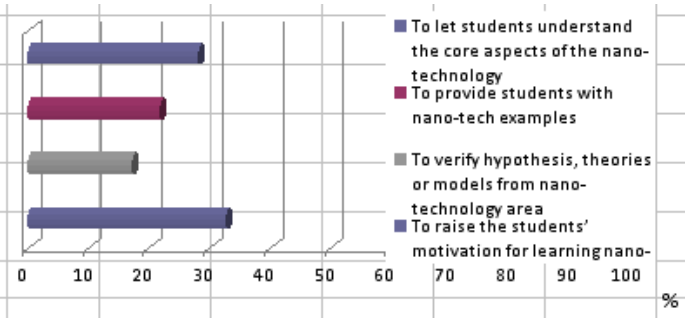
- 62.86% of Science teachers declare they implement sometimes ready-made ICT tools for teaching Science topics.

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	28.13
To provide students with nano-tech examples	21.88
To verify hypothesis, theories or models from nano-technology area	17.19
To raise the students' motivation for learning nano-technology	32.81
	100.00



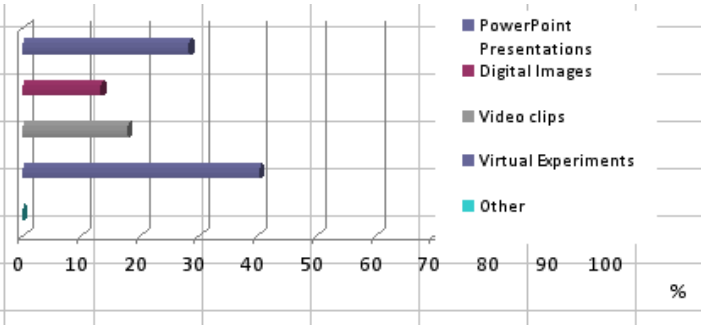
- 32.81% of Science teachers declare that raising the students' motivation for learning Nano-technology represents the purpose of using Nano-Tech experiments in the classroom by the use of ICT.
- just 17.19% of Science teachers declare that verifying hypothesis, theories or models from Nano-technology 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
Digital Images	13.43
Video clips	17.91
Virtual Experiments	40.30
Other	0.00
	100.00



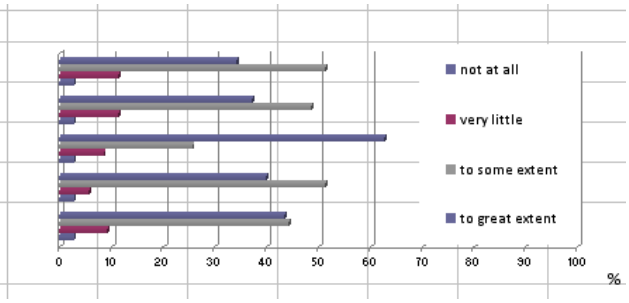
- 40.30% of Science teachers intend to use Virtual Experiments for presenting Nano-tech experiments in the lessons.
- just 13.43% of Science teachers intend to use digital images for presenting Nano-tech experiments in the lessons.

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.

Results diagram is presented below:

	not at all	very little	to some extent	to great extent
as a method to explain the "Inquiry Based Science Education" concept	2.86	11.43	51.43	34.29
as a way for better planning of an experiment	2.86	11.43	48.57	37.14
as a channel for guiding students to explain scientific aspects and propose	2.86	8.57	25.71	62.86
as a method to enhance creativity in teaching and learning process	2.86	5.71	51.43	40.00
	2.86	9.29	44.29	43.57



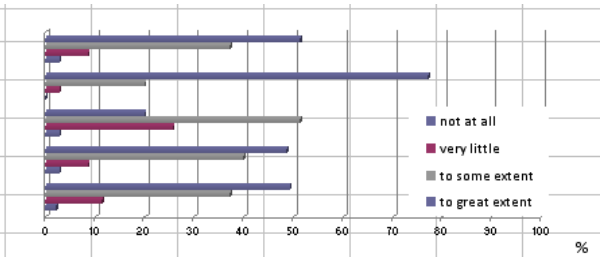
- 62.86% of Science teachers appreciate (in a great extent) that ICT tools represent a channel for guiding students to explain scientific aspects and propose hypothesis for investigation, considering the importance of ICT tools to the promoting of inquiry based/creative learning about Science/Nano-Tech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

Results diagram is presented below:

		not at all	very little	to some extent	to great extent
a	as a method to increase students' motivation	2.86	8.57	37.14	51.43
b	as a method to make learning content more attractive (by using virtual	0.00	2.86	20.00	77.14
c	as a way to make students more emotional (by connecting them)	2.86	25.71	51.43	20.00
d	as a method to promote creativity based on collaborative work	2.86	8.57	40.00	48.57
GEN.		2.14	11.43	37.14	49.29



- 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.

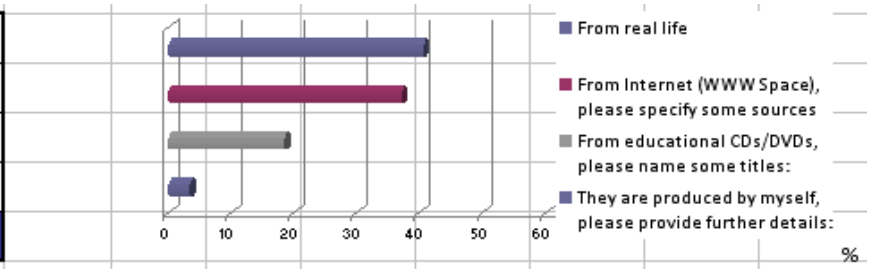
- however, 51.43% of Science teachers appreciate (in a great extent) that ICT tools represent method to increase students' motivation, considering the role of ICT tools for teaching Science/Nano-Tech topics.

Question no. 17:

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

Results diagram is presented below:

From real life	40.68
From Internet (WWW Space), please specify some sources	37.29
From educational CDs/DVDs, please name some titles:	18.64
They are produced by myself, please provide further details:	3.39
	100.00



- 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: http://www.chemcollective.org/vlab/vlab.php, http://www.nanotek.nu/ and http://nanoyou.eu/.

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

Report on the Results gathered from the Evaluation Questionnaire for Teachers in Bulgaria

The analysis is based on the results from 42 respondents; questionnaires collected in July and August 2011.

Question no. 1:

1. Which kind of topics in science education would you consider to be more appealing for students? (e.g. traditional or basic subjects, problems of global importance or scale, topics oriented towards high technologies and innovation, subjects of special importance for human life or improvement of the human condition, topics significant for business applications or future development, other, etc.)

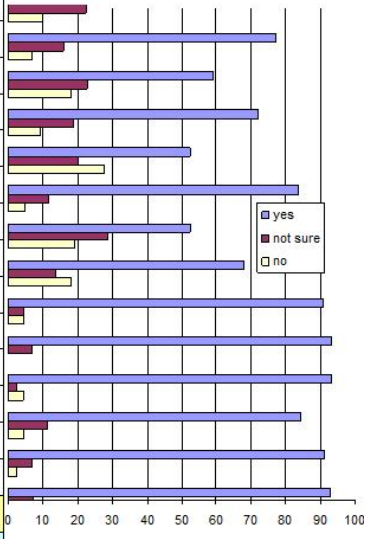
- The majority of teachers indicate that **all topics** are appropriate and appealing to students, but they must comply with the age and interests and to be presented in an attractive manner. Respondents believe that the topics are more intriguing when demonstrating their direct impact on *how they can make human life easier*.
- Respondents believe that the topics should be **illustrated and explained with examples** and issues of particular importance to human life, improving conditions of human existence, oriented to the current modern discoveries in the fields of high technology and innovation, topics of importance for use in business, future personal and universal development.
- Some of those interviewed believe that for students below seventh grade is good to learn traditional or basic parts of the material in all natural sciences, and also to include topics on issues of global concern. For high-school students is good to include issues-oriented high-tech subjects of particular importance to human life or such that improve the conditions of human existence, as well as topics of importance for use in business or future development.

Question no. 2:

2. Which of the extracurricular topics should be integrated with science topics?

Results are presented in the chart below:

	yes	not sure	no
Optical instruments and how they work	67,50	22,50	10,00
The use of lasers	77,27	15,91	6,82
How CDs and DVDs store and play sound and image	59,09	22,73	18,18
Organic and ecological farming without use of pesticides and artificial fertilizers	72,09	18,60	9,30
How radios and TVs work	52,50	20,00	27,50
How mobile phones can send and receive messages	83,72	11,63	4,65
Life and death and human soul	52,38	28,57	19,05
Why we can see the rainbow	68,18	13,64	18,18
The ozone layer and how it may be affected by humans	90,91	4,55	4,55
How technology helps us to handle waste, garbage and sewage	93,18	6,82	0,00
How energy can be saved or used in a more effective way	93,18	2,27	4,55
How gene technology prevent diseases	84,44	11,11	4,44
Very recent inventions and discoveries in science and technology	91,11	6,67	2,22
Nanotechnology and its uses	92,86	7,14	0,00
Total	77,32	13,58	9,11
	yes %	not sure %	no %



The most of the interviewed teachers are interested in the following subjects:

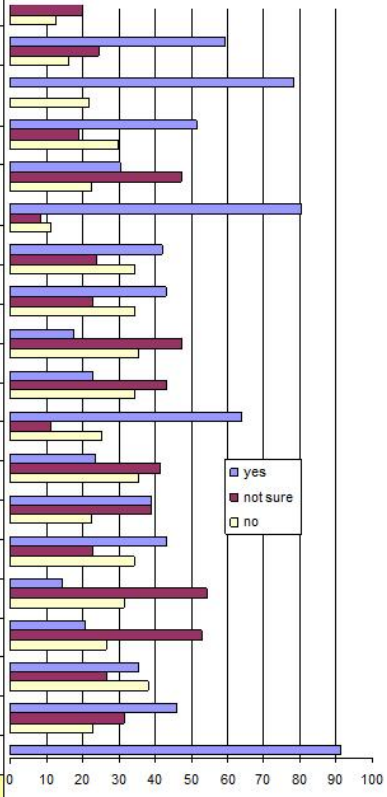
- How technology helps us to handle waste, garbage and sewage – 93.18%
- How energy can be saved or used in a more effective way – 93.18%
- Nanotechnology and its uses – 92.86%
- Very recent inventions and discoveries in science and technology – 91.11%
- The ozone layer and how it may be affected by humans – 90.91%

For this question we have to mention that all of the proposed subjects have score quite above 50% (average: 77.32%)

Question no. 3:

3. Do you have any knowledge about nanotechnology? If yes, which of the curriculum topics are related with nanotechnology?

	yes	not sure	no
Chemicals, their properties and how they react	67,50	20,00	12,50
Parts of human body and how the systems work	59,46	24,32	16,22
Structure of DNA, genetic studies, heredity and how genes influence how we develop reproduction in humans	78,38	0,00	21,62
How plants and animals grow and reproduce	51,35	18,92	29,73
How people, animals, plants and the environment depend on each other	30,56	47,22	22,22
Atom, molecules and chemical bonding	80,56	8,33	11,11
Light and its nature	42,11	23,68	34,21
Radioactivity and its effects	42,86	22,86	34,29
The nature of sound and its properties	17,65	47,06	35,29
Velocity and the relationship between velocity, time and road	22,86	42,86	34,29
The structure of cell, mitosis and meiosis	63,89	11,11	25,00
Simple machines and how they ease our lives	23,53	41,18	35,29
Electricity and its properties	38,89	38,89	22,22
Optics and how they are used in our daily lives	42,86	22,86	34,29
Structure of Earth and how earthquakes happen	14,29	54,29	31,43
Clouds, rain and the weather	20,59	52,94	26,47
Sustainable energy and its sources	35,29	26,47	38,24
heat and temperature	45,71	31,43	22,86
Technology and its interaction with science	91,43	0,00	8,57
Total	41,87	30,08	28,05
	yes %	not sure %	no %



The **3 most popular** answers are:

- Technology and its interaction with science – 91.43%
- Atom, molecules and chemical bonding – 80.56%
- Structure of DNA, genetic studies, heredity and how genes influence how we develop reproduction in humans – 78.38%

The teachers distinguished also:

- Chemicals, their properties and how they react – 67.50%
- The structure of cell, mitosis and meiosis – 63.89%
- How plants and animals grow and reproduce – 51.35%

The question contains an open field "Other [topics], please specify…" under which some of the respondents added the following:

- Diagnosis and treatment in medicine; tumor treatment
- Production of certain food products such as nutritional supplements
- Production of passive nano-materials as titanium dioxide in sunscreen cream and other cosmetic products
- Surface coatings such as silver in food products, clothing, disinfectants and household appliances, paints, varnishes and other

Most of these additional topics (if not all) are not included in the general curriculum for science subjects.

Note to Q3: We should to note that the way the question is asked does not allow analyzing whether the results show personal or professional opinion of the respondents according to the subject they teach. We are not able to separate objective opinion associated with the professional competence of the interviewed teachers related to educational content and the curriculum to the subjective opinion related to personal competence of the surveyed.

Also, since no data was collected about the subject which respondents teach, no proper analyze of the results obtained in percentages can be performed.

Question no. 4:

4. Which science topics do you think that should be supported with experiments for a meaningful and permanent learning?

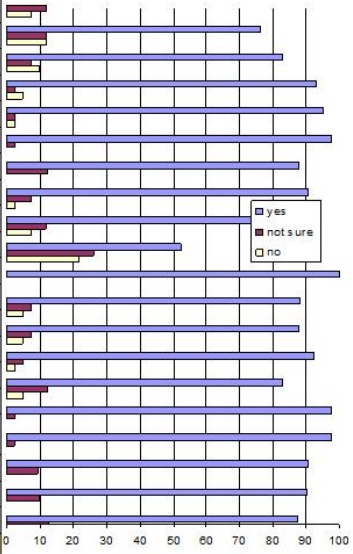
The variety of answers to this question indicates the interest of respondents to this matter:

- Chemistry and the environment, physics and astronomy, biology and health education;
- Sustainable energy and its energy sources;
- Electricity and its properties;
- Optical phenomena and their use in everyday life;
- Simple machines and how they make life easier;
- Areas related to health;
- Energy sources;
- Technologies;
- Optics;
- Atomic and Nuclear physics;
- Magnetism;
- Structure of the cell;
- Examination of samples of materials produced by nanotechnology or those with nanocoatings.

Question no. 5:

5. Science education should involve the following:

	yes	not sure	no
Make pupils aware of the unlimited aspects of science	80,95	11,90	7,14
Be able to use scientific equipment skillfully	76,19	11,90	11,90
Be able to demonstrate experiments	82,93	7,32	9,76
Use information technology	92,86	2,38	4,76
Expect pupils to use the proper terminology correctly	95,24	2,38	2,38
Link new science learning to everyday experiences	97,62	2,38	0,00
Help pupils to understand the importance of science in modern business applications	87,80	12,20	0,00
Encourage pupils to try out their own ideas in experiments	90,48	7,14	2,38
Teach pupils to understand science concepts	80,95	11,90	7,14
Frequently revise previous learning	52,38	26,19	21,43
Show how classroom learning relates to phenomena in outside world and everyday life	100,00	0,00	0,00
Explain to pupils how to use the scientific knowledge and why their science activity is important	88,10	7,14	4,76
Help pupils become aware of the benefits and misuses of science	87,80	7,32	4,88
Relate each new idea (concept) to ones the pupils have already learnt	92,50	5,00	2,50
Use visits to industry to support science learning	82,93	12,20	4,88
Use field trips to support science learning	97,95	2,44	0,00
Develop a personal interest in science /e.g. find new and exciting scientific topics to enrich their understanding of new horizons/	97,62	2,38	0,00
Enable the pupils to integrate with everyday lives and problems of global importance, scientific/technological achievements	90,48	9,52	0,00
Raise awareness related to the nanotechnology by introducing short talks at the last 10 minutes of learning unit	90,24	9,76	0,00
Offer short reports on modern achievements in science at the micro- and nano-level to be added to every learning unit	87,50	12,50	0,00
Total	87,54	9,00	3,46
	yes %	not sure %	no %



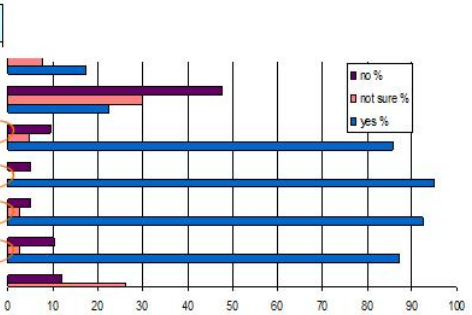
- Show how classroom learning relates to phenomena in outside world and everyday life – 100%
- Link new science learning to everyday experiences – 97,62%
- Develop a personal interest in science /e.g. find new and exciting scientific topics to enrich their understanding of new horizons/ - 97.62%
- Use field trips to support science learning – 97.56%

For this question we have to mention that all of the proposed subjects have score quite above 50% (average: 87.54%)

Question no. 6:

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

	no %	not sure %	yes %
Formal lessons	75,00	7,50	17,50
Reading textbooks	47,50	30,00	22,50
Watching clips and documentaries	9,52	4,76	85,71
Interactive computer based tools	5,13	0,00	94,87
Direct experiments using measuring equipment	5,00	2,50	92,50
Pre-recorded or filmed experiments with explanations	10,26	2,56	87,18
Less structured experiments	11,90	26,19	61,90
Total	23,40	10,64	65,96
	yes %	not sure %	no %



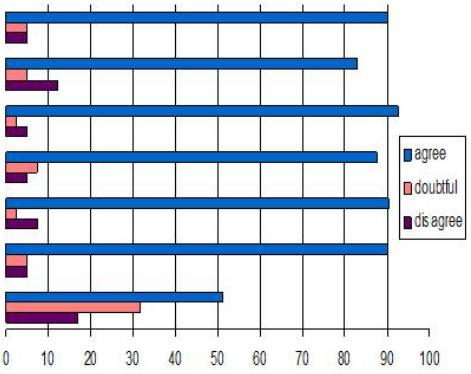
- Interactive computer based tools – 94.87%
- Direct experiments using measuring equipment – 92.50%
- Pre-recorded or filmed experiments with explanations – 87.18%
- Watching clips and documentaries – 85.71%

Only 17.50% of the interviewed teachers think that *formal lessons* are the effective way of teaching scientific topics.

Question no. 7:

7. Please, rate the importance of the following tools for an online virtual lab:

Q7		disagree	doubtful	agree
a	Texts	17,07	31,71	51,22
b	Images	5,00	5,00	90,00
c	Video	7,32	2,44	90,24
	Simulations	5,00	7,50	87,50
e	Interactive simulations	5,00	2,50	92,50
f	Procedures to carry out experiments with the students	12,20	4,88	82,93
h	Resource library	5,00	5,00	90,00
	Total	8,13	8,48	83,39
		yes %	not sure %	no %



The importance is rated as follows:

Interactive simulations	92,50%
Video	90,24%
Images	90,00%
Resource library	90,00%
Simulations	87,50%
Procedures to carry out experiments with the students	82,93%
Texts	51,22%

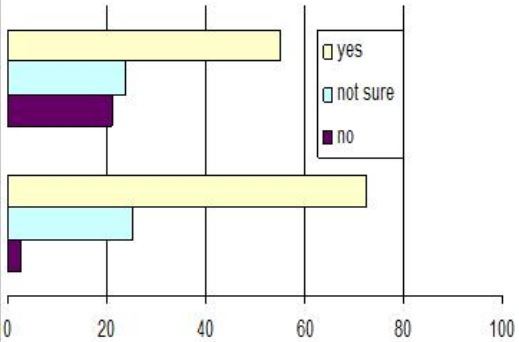
The question contained an open field "Other [tools], please specify…" which was not filled in by any of the 42 respondents whose answers have been taken in consideration for this analysis.

Note to Q7: This question is not sufficiently clearly defined – It does not provide definition of what does "an online virtual lab" means. As shaped the question suggests own interpretation of the respondents and does not allow analysis of the results.

Question no. 8:

8. What type of lab approach you prefer?

	yes	not sure	no
Cook-book type laboratory activities (step-by step instructions) to verify scientific facts.	55,26	23,68	21,05
Inquiry-based laboratory activities (students decide how to conduct the activity, and have to explore in order to figure out how the world works).	72,50	25,00	2,50
Total	64,10	24,36	11,54
	yes %	not sure %	no %



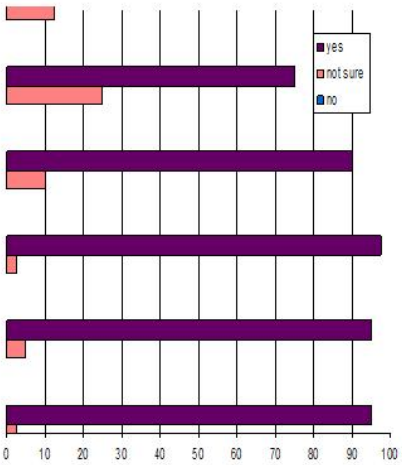
- 72,50% of the teachers prefer *Inquiry-based laboratory activities* (students decide how to conduct the activity, and have to explore in order to figure out how the world works);
- 55.26% prefer *Cook-book type laboratory activities* (step-by step instructions) to verify scientific fact

The overall result is over 100%, which means that **some of the interviewed teachers pointed both answers**.

Question no. 9:

9. What do you think that the appropriate activities in a laboratory would be?

Q9		yes	not sure	no
a	Students should get involved with scientifically oriented questions	87,50	12,50	0,00
b	Students should have (be provided with) the ability to determine what data allows them to develop and evaluate scientific explanations.	75,00	25,00	0,00
c	Students should have (be provided with) the ability to formulate their own explanations from the evidence they have obtained.	90,00	10,00	0,00
d	Students should have (be provided with) the ability to expand upon their findings and relate those findings to similar situations.	97,50	2,50	0,00
e	Students should have (be provided with) the ability to communicate their experimental findings to others in class via written laboratory reports.	95,00	5,00	0,00
f	Students should be able to have access to experiments on-line which cannot be done in a laboratory	95,00	2,50	2,50
Gen	Total	90,25	9,32	0,42
		yes %	not sure %	no %

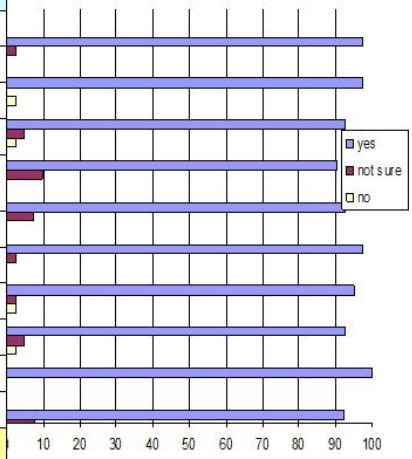


90.25% of all interviewed teachers think that **all of the subjects** pointed in that question are appropriate activities in a laboratory.

Question no. 10:

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

Q10		yes	not sure	no
a	Make observations	100,00	0,00	0,00
b	Pose questions	97,56	2,44	0,00
c	Have access to an e-Library (other sources of information	97,56	0,00	2,44
d	Plan investigations	92,68	4,88	2,44
e	Reviewing what is already known in light of experimental evidence.	90,24	9,76	0,00
f	Use (virtual) tools to gather, analyze and interpret data	92,68	7,32	0,00
h	Propose answers, explanations, and predictions	97,56	2,44	0,00
i	Communicate the results	95,12	2,44	2,44
j	Identify assumptions	92,68	4,88	2,44
k	Use critical and logical thinking	100,00	0,00	0,00
l	Consider alternative explanations	92,50	7,50	0,00
Gen	Total	95,32	3,79	0,89
		yes %	not sure %	no %



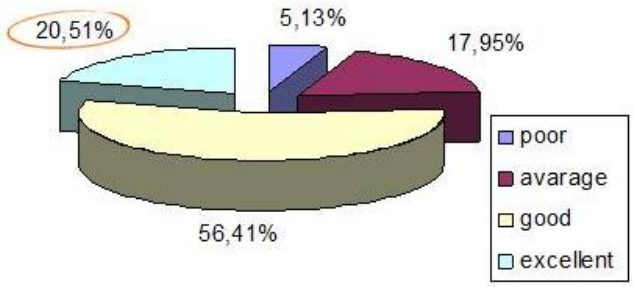
100% of the teachers answer that the students should be able to *Make observations* and *Use critical and logical thinking.*

The other scours are also very high – average 95.32%!

Question no. 11:

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

	poor	avarage	good	excellent
11. How well are you able to manage with using ICT tools for teaching Science topics?	5,13	17,95	56,41	20,51



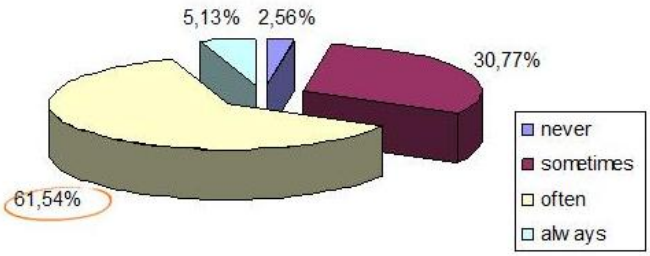
Only **20.51%** declare are **excellent** in managing ICT tools, but **56.41%** declare they are **good** in managing ICT tools.

Note to Q11: This question is not sufficiently precisely defined and is shaped in a way that suggests own interpretation of the respondents. What does using "ICT tools for teaching Science topics" means for each respondent? Some teachers may understand just using PPT… This assumption is partially supported also by the answers of the Q14 below.

Question no. 12:

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

	never	sometimes	often	always
12. To what extent do you implement ready-made ICT tools for teaching Science topics?	2,56	30,77	61,54	5,13



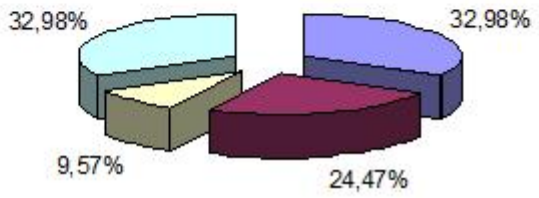
61.54% declare using ready-made ICT tools for teaching Science topics.

Note to Q12: The question failed to ask which are the sources for "ready-made ICT tools for teaching Science topics". Collecting this information would have been useful as a contribution to the contents of the NTSE virtual repository.

Question no. 13:

13. What is the purpose of using Nano-tech experiments in your classroom by the use of ICT?

	%
To let students understand the core aspects of the nano-technology	32,98
To provide students with nano-tech examples	24,47
To verify hypothesis, theories or models from nano-technology area	9,57
To raise the students' motivation for learning nano-technology	32,98

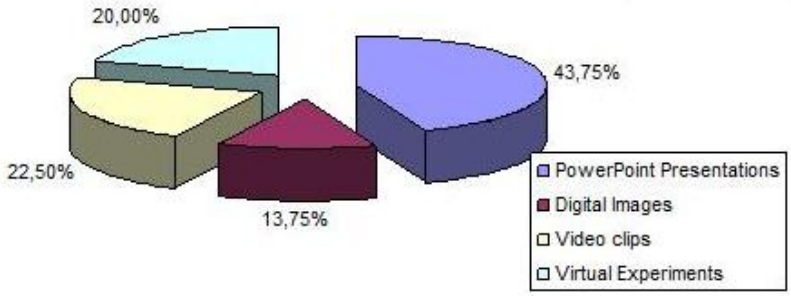


The highest rates are for: *To let students understand the core aspects of the nano-technology* and *To raise the students' motivation for learning nano-technology* (each with 32.98%). Seem strange that the *motivation for learning nano-technologies* is ranged higher than the answer "to provide students with nano-tech examples" which would be the expected answer for teachers in an average schools. Possible explanation for such results would be the assumption that most of the respondents teach in specialized schools for which students choosing a career in the field of sciences is more likely.

Question no. 14:

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

Q14		%
a	PowerPoint Presentations	**43,75**
b	Digital Images	**13,75**
c	Video clips	**22,50**
d	Virtual Experiments	**20,00**



43.75% declared they use PowerPoint Presentations. Unfortunately the formulation of the question do not allow making a relevant conclusion whether this answer is an indication for the *type of the prevailing sources* which are accessible to the respondents or for the level of their ICT competences.

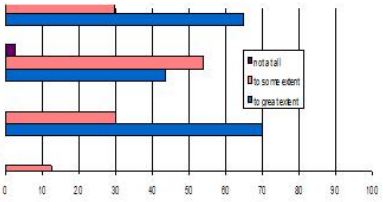
The question contained an open field "Other [ICT tools], please specify…" which was not filled in by any of the 42 respondents whose answers have been taken in consideration for this analysis. However, put after a relatively exhaustive enumeration, this question was addressing the **type** of the ICT tools (supposedly) used by the respondents.

> ***Note to Q14:*** It was necessary for those who pointed in their answer that they use "virtual experiments" to have also sub question to identify the sources they use. This information would have been useful as a contribution to the contents of the NTSE virtual repository.

Question no. 15:

15. Evaluate (on a scale from 1 to 3) how important are ICT tools to you for the purpose of promoting an inquiry based/creative learning environment in Science teaching?

Q15		not at all	to some extent	to great extent
a	as a method to explain the "Inquiry Based Science Education" concept	5,41	29,73	64,86
b	as a way for better planning of an experiment	2,56	53,85	43,59
c	as a channel for guiding students to explain scientific aspects and propose hypothesis for investigation	0,00	30,00	70,00
d	as a method to enhance creativity in teaching and learning process	0,00	12,50	87,50
Gen	Total	1,92	31,41	66,67



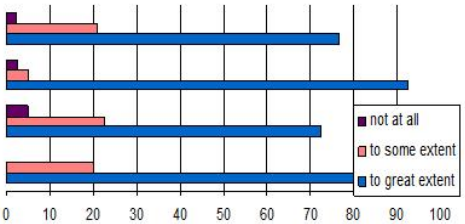
87.50% vote for ICT being *a method to enhance creativity in teaching and learning process*, and **70%** for it being a *channel for guiding students to explain scientific aspects and propose hypothesis for investigation*.

It has to be mentioned that above 50% (average: 66.67%) of the respondents rated the importance of the ICT tools for all aspects of the inquiry based/creative learning mentioned in this question.

Question no. 16:

16. Evaluate (on a scale from 1 to 3) how do you consider collaboration* using ICT for teaching Science/Nano-Tech topics?

Q16		not at all	to some extent	to great extent
a	as a method to increase students' motivation	2,33	20,93	76,74
b	as a method to make learning content more attractive (by using virtual environments and multimedia tools)	2,50	5,00	92,50
c	as a way to make students more emotional	5,00	22,50	72,50
d	as a method to promote creativity based on collaborative work	0,00	20,00	80,00
Gen	Total	2,45	17,18	80,37
		not at all %	to some extent %	to great extent %



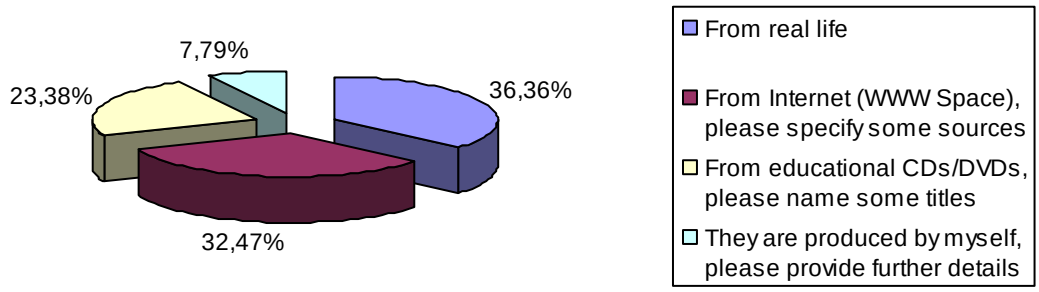
*This question in its variant in Bulgarian language contained additional specification "**collaboration with your colleagues or other specialists through ICT**" which is important to be taken in consideration when reading the data.

The importance of *collaboration using ICT* is considered most effective as a method to *make learning content more attractive* by **92,50%** of the respondents. However, the information added in the brackets puts a special emphasis on this answer, linking it with "using virtual environments and multimedia tools". This adds an ambivalent aspect on the results, as it is not clear if the leading motivation of the respondents was to emphasize in general on the role of the collaboration through ICT for making "learning content more attractive" or that they consider "using virtual environments and multimedia tools" in particular as necessary element of the collaboration.

It has to be mentioned that the use of ICT for collaboration is rated **above 50%** (average 80.37%) as important for teaching Science/Nano-Tech topics, incl. *as a way to make students more emotional*.

Question no. 17:

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



It is important to underline that the highest score here – 36,36% received the suggestion *from real life*, only then followed by the *internet* as a source for good examples.
We would suggest this result to be considered for verification of the respondents' answers concerning the use of ICT and the estimation of the role of the ICT tools.

With the view of Q17 it is also important to pay attention to the fact that none of the respondents mentioned a particular web-based source or educational CD actually used in his/her practice. The possible reasons for the lack of particular data about sources/ programs could be:
a/ the fact that Q17 is the last one within a pretty long questionnaire and the respondents were already too fatigued to go into details
or
b/ the lack of real implementation of ICT based tools in their practice.
However, we have no basis to support either of these two hypotheses.

General Notes

We should note that some of the questions in the questionnaire are not sufficiently clearly defined and are shaped in a way that suggests own interpretation by the respondents, resulting in a high percentage of subjectivity in the answers, because the question has not been understood correctly. This had not allowed deeper specification of the data meaning and more precise analysis of the answers.

Few questions in the questionnaire contain an open field ("please specify: ....") and most of these are added after fairly exhaustive enumeration (ref. Q6, Q7, Q14). As a consequence none of the 42 respondents whose answers have been taken in consideration for this analysis had mentioned any additional suggestion under these questions.

Only one question (Q17) contains direct request for specification of web-based resources and names of programs (educational CD/DVDs) used so far by the respondents and none of the respondents gave details on these. Several opportunities for placing open fields for sharing relevant information within other questions were missed, hence no data for constructive interpretation the results from Q17 are available.

More open fields and encouragement for sharing data and personal experience would have allowed also collecting useful information for the NTSE repository which will be part of the virtual lab.

The very high scores in the answers to some questions which show massive support to most of the enumerated statements raises doubts towards the relevance of asking such a question which (seems) contains all answers in itself or trigger answers "by default" (ref. Q9, Q10). Equally questionable is the contents of Q5 in which many of the suggestions are already defined by the national curriculum for teaching sciences.

A disadvantage for the analysis of the data was also the fact that the questionnaire does not provide data about socio-demographic and professional characteristics of respondents (e.g. number of years in the profession; subject taught; school level/age of students; big city/ small town; general school/ specialized school, etc., etc.) which limited the opportunities for more precise analysis of the data.

6.3 Evaluation Questionnaire for Prospective Teachers

Report on the Average Results gathered from the Evaluation Questionnaire for Prospective Teachers in Turkey

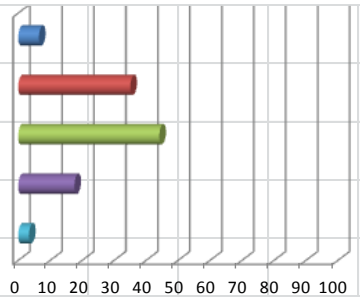
Number of questioned prospective teachers: 67

Question no. 1:

How would you describe your knowledge about nanotechnology?

Results diagram is presented below:

I am proficient to teach nanotechnology without any training required	6,45
I have knowledge about some basic concepts	35,05
I just know what it is but do not have any further knowledge	44,12
I only have heard the name of nanotechnology	17,56
I have never heard about it	3,33

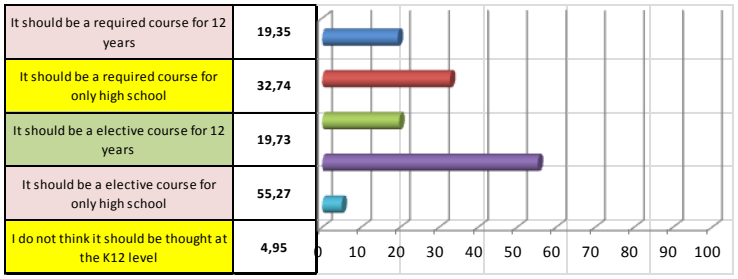


- % 44,12 of the prospective teachers consider that they just know what it is but do not have any further knowledge
- % 35,05 of the prospective teachers thinks that they have knowledge about some basic concepts
- % 17,56 of the prospective teachers only have heard the name of nanotechnology
- % 6,45 of the prospective teachers consider themselves as proficient to teach nanotechnology without any training required.
- % 3,33 of the prospective teachers have never heard about nanotechnology.
-

Question no. 2:

What do you think about teaching the emerging sciences (i.e nanotechnology) to K12 students?

Results diagram is presented below:

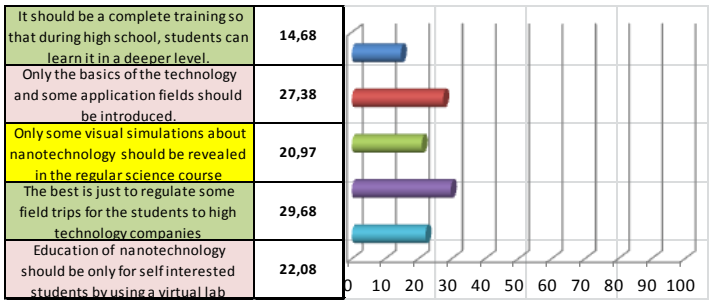


- % 52,27 of the prospective teachers consider that the emerging sciences like nanotechnology should be an elective course for only high school.
- % 32,74 of the prospective teachers consider that the emerging sciences like nanotechnology should be a required course for only high school
- % 19,73 of the prospective teachers consider that the emerging sciences like nanotechnology should be an elective course for 12 years
- % 19,35 of the prospective teachers consider that the emerging sciences like nanotechnology should be a required course for 12 years.
- % 4,95 of the prospective teachers consider that the emerging sciences like nanotechnology should be thought at the K12 level.

Question no. 3:

If nanotechnology is thought what should be the level for elementary school students?

Results diagram is presented below:



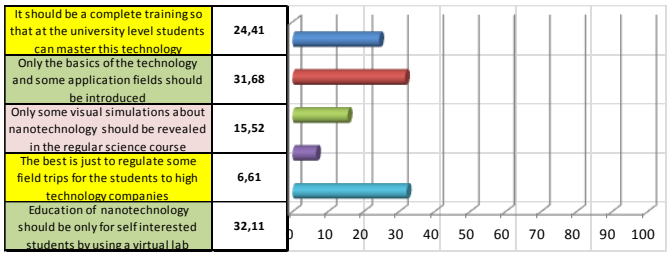
- %29,68 of the prospective teachers believe that the best is just to regulate some field trips for the students to high technology companies.
- % 27,38 of the prospective teachers believe that only the basics of the technology and some application fields should be introduced.
- % 22,08 of the prospective teachers believe that education of nanotechnology should be only for self-interested students by using a virtual lab.
- % 20,97 of the prospective teachers believe that only some visual simulations about nanotechnology should be revealed in the regular science course.

- % 14,68 of the prospective teachers believe that it should be a complete training so that during high school, students can learn it in a deeper level.

Question no. 4:

If nanotechnology is taught what should be the level for high school students?

Results diagram is presented below:

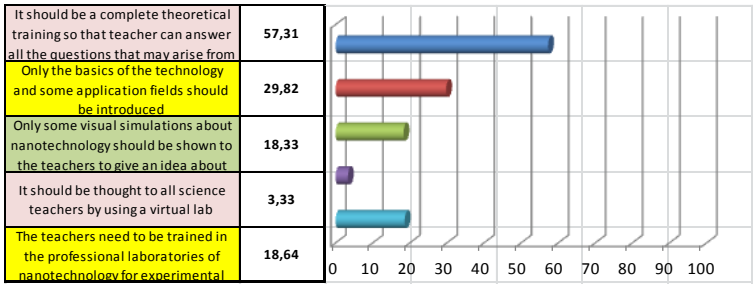


- % 32,11 of the prospective teachers consider that education of nanotechnology should be only for self-interested students by using a virtual lab.
- % 31,68 of the prospective teachers consider that only the basics of the technology and some application fields should be introduced.
- % 24,41 of the prospective teachers consider that it should be a complete training so that at the university level students can master this technology.
- % 15,52 of the prospective teachers consider that only some visual simulations about nanotechnology should be revealed in the regular science course.
- % 6,61 of the prospective teachers consider that the best is just to regulate some field trips for the students to high technology companies.

Question no. 5:

If nanotechnology is taught to the science teachers what would be the level?

Results diagram is presented below:



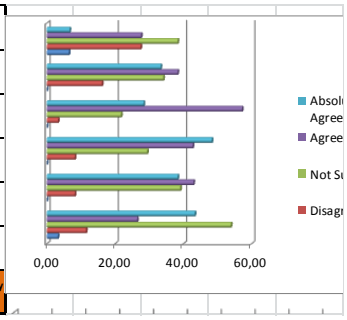
- % 57,31 of the prospective teachers believe that ilt should be a complete theoretical training so that teacher can answer all the questions that may arise from the students
- % 29,82 of the prospective teachers believe that only the basics of the technology and some application fields should be introduced
- % 18,64 of the prospective teachers believe that the teachers need to be trained in the professional laboratories of nanotechnology for experimental experience and theoretical knowledge
- % 18,33 of the prospective teachers believe that only some visual simulations about nanotechnology should be shown to the teachers to give an idea about this science.
- % 3,33 of the prospective teachers believe that it should be thought to all science teachers by using a virtual lab.

Question no. 6:

The most effective way to teach a scientific topic in general is:

Results diagram is presented below:

Formal lessons	3,23	11,45	53,92	26,45	43,33
Reading textbooks	#SAYI/0!	8,17	39,09	42,94	38,33
Watching clips and documentaries	#SAYI/0!	8,17	29,41	42,72	48,33
Interactive computer based tools	#SAYI/0!	3,28	21,76	57,17	28,33
Experiments	#SAYI/0!	16,13	34,12	38,28	33,33
Less structured experiments	6,45	27,46	38,32	27,63	6,67
	% Absolutely Disagree	% Disagree	%Not Sure	% Agree	% Absolutely Agree



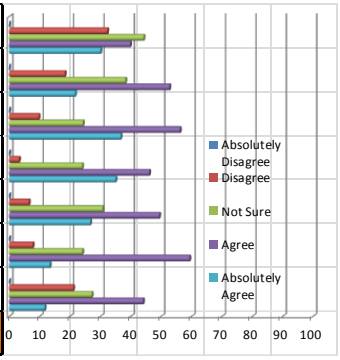
- % 48,33 of the prospective teachers absolutely agree that watching clips and documentaries are the most effective way to teach a scientific topic.
- % 43,33 of the prospective teachers absolutely agree that formal lessons is another effective way.
- % 38,33 of the prospective teachers absolutely agree that reading textbooks is the most effective way to teach a scientific topic.
- % 33,33 of the prospective teachers absolutely agree that experiments is the most effective way to teach a scientific topic.
- % 6,67 of the prospective teachers absolutely agree that less structured experiments is the most effective way to teach a scientific topic.

Question no. 7:

Do you think the following tools are important for an online virtual lab?

Results diagram is presented below:

Texts	#SAYI/0!	32,26	44,19	39,78	30,00
Images	#SAYI/0!	18,28	38,24	52,69	21,67
Video	#SAYI/0!	9,68	24,25	56,16	36,67
Simulations	#SAYI/0!	3,23	23,98	46,06	35,00
Interactive simulations	#SAYI/0!	6,45	30,72	49,35	26,67
Procedures to carry out experiments with the students	#SAYI/0!	7,74	24,05	59,32	13,33
Resource library	#SAYI/0!	21,04	27,17	44,01	11,67
	% Absolutely Disagree	% Disagree	%Not Sure	% Agree	% Absolutely Agree



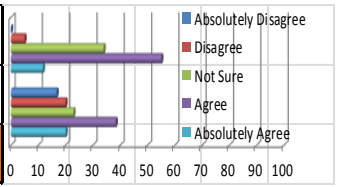
- % 59,32 of the prospective teachers agree that procedures to carry out experiments with the students are important for visual lab.
- % 56,16 of the prospective teachers agree that videos are important for an online virtual lab.
- % 52,69 of the prospective teachers agree that images are important . for an online virtual lab.
- % 49,35 of the prospective teachers agree that interactive simulations are important for an online virtual lab.

Question no. 8:

Which type of lab approach do you think is better?

Results diagram is presented below:

Cook-book type laboratory activities (step-by step instructions) to verify scientific facts.	#SAYI/0!	4,95	33,91	55,02	11,67
Inquiry-based laboratory activities (students decide how to conduct the activity, and have to explore in order	16,67	19,93	22,87	38,32	20,00
	% Absolutely Disagree	% Disagree	%Not Sure	% Agree	% Absolutely Agree



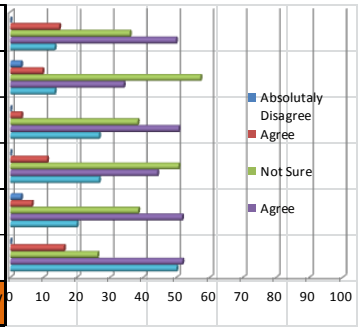
- % 55,02 of the prospective teachers agree that cook book type laboratory activities are better.
- % 20 of the prospective teachers absolutely agree that inquiry based laboratory activities are better.

Question no. 9:

The regarding activities in a laboratory would be;

Results diagram is presented below:

Students should be engaged by scientifically oriented questions.	#SAYI/0!	14,68	35,95	49,82	13,33
Students should have (be provided) the ability to determine what data allows them to develop and	3,23	9,68	57,17	34,09	13,33
Students should have (be provided) the ability to formulate their own explanations from the evidence they	#SAYI/0!	3,28	38,28	50,65	26,67
Students should have (be provided) the ability to expand upon their findings and relate those findings to	#SAYI/0!	11,04	50,61	44,19	26,67
Students should be able to access to the experiments on-line that cannot be done in a laboratory	3,23	6,45	38,46	51,65	20,00
Students should have (be provided) the ability to communicate their experimental findings to others in	0,00	16,13	26,20	51,76	50,00
	% Absolutaly Disagree	% Disagree	%Not Sure	% Agree	% Absolutaly Agree



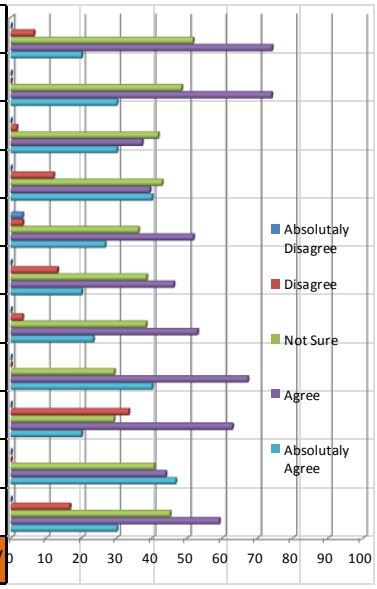
- % 50 of the prospective teachers absolutely agree and another %51,76 agree that Students should have (be provided) the ability to communicate their experimental findings to others in class via written laboratory reports.
- % 51,65 of the prospective teachers agree that students should be able to access to the experiments on-line that cannot be done in a laboratory.
- % 50,65 of the prospective teachers agree that students should have (be provided) the ability to formulate their own explanations from the evidence they have obtained.

Question no. 10:

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

Results diagram is presented below:

Make observations.	#SAYI/0!	6,45	51,61	73,98	20,00
Pose questions.	#SAYI/0!	0,00	48,39	73,87	30,00
Have access to an e-Library (other sources of information).	#SAYI/0!	1,61	41,76	37,17	30,00
Plan investigations.	#SAYI/0!	12,04	42,83	39,35	40,00
Reviewing what is already known in light of experimental evidence.	3,23	3,28	36,13	51,72	26,67
Use (virtual) tools to gather, analyze and interpret data.	#SAYI/0!	13,17	38,42	46,13	20,00
Propose answers, explanations, and predictions.	#SAYI/0!	3,23	38,28	52,87	23,33
Communicate the results.	#SAYI/0!	#SAYI/0!	29,30	67,13	40,00
Identify assumptions.	#SAYI/0!	33,33	29,19	62,76	20,00
Use critical and logical thinking.	#SAYI/0!	#SAYI/0!	40,57	43,87	46,67
Consider alternative explanations.	#SAYI/0!	16,67	45,09	59,03	30,00
	% Absolutaly Disagree	% Disagree	%Not Sure	% Agree	% Absolutaly Agree



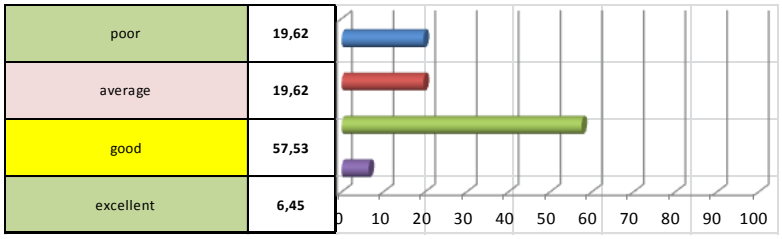
- %73,98 of the prospective teachers agree that students should be able to make observations.

- %73,87 of the prospective teachers agree that students should be able to pose questions.
- % 67,13 of the prospective teachers agree that students should be able to communicate the results.
- % 62,76 of the prospective teachers agree that students should be able to identify assumptions.
- % 59,03 of the prospective teachers agree that students should be able to consider alternative explanations.
- % 52,87 of the prospective teachers agree that students should be able to propose answers, explanations and predictions.
- % 51,72 of the prospective teachers agree that students should be able to reviewing what is already known in light of experimental evidence.

Question no. 11:

To what extent do you know to use ICT tools for teaching Science/Nano-Tech topics?

Results diagram is presented below:



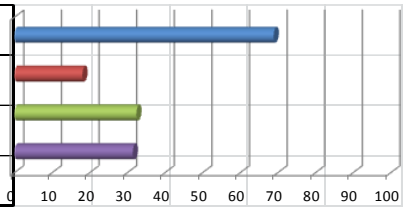
- % 57,53 of the prospective teachers are good in using the ICT tools for teaching science/nano topics.

Question no. 12:

Which kind(s) of ICT tools do you intend to use for leading nano-tech experiments in your future lessons?

Results diagram is presented below:

PowerPoint Presentations	68,85
Images	18,03
Video clips	32,38
Virtual Experiments	31,42



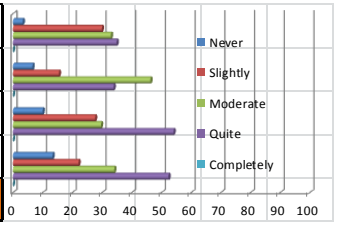
- % 68,85 of the prospective teachers intend to use power point presentations to lead the nanotech activities.

Question no. 13:

Evaluate (on a scale from 1 to 5) how important are ICT tools for you when considering their usefulness for teaching Science/Nano-Tech topics?

Results diagram is presented below:

as a source of inspiration for you as a future teacher	3,28	29,93	32,97	34,91	#SAYI/0!
as an effective learning environment	6,56	15,45	46,27	33,91	#SAYI/0!
as a method to improve students' learning skills	10,00	27,63	29,64	54,09	#SAYI/0!
as a way for improving students' understanding	13,33	22,08	34,12	52,37	#SAYI/0!
	% Never	% Slightly	% Moderate	% Quite	% Completely



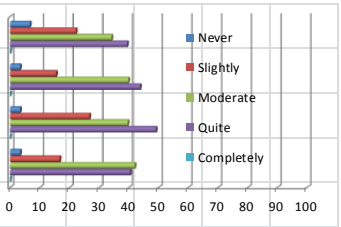
- % 54,09 of the prospective teachers believe that ICT tools are quite important as a method to improve students' learning skills
- % 52,37 of the prospective teachers believe that ICT tools are quite important as a way for improving students' understanding.

Question no. 14:

Evaluate (on a scale from 1 to5) how important are ICT tools for you related to the promoting of inquiry based/creative learning about Science/Nano-Tech topics?

Results diagram is presented below:

as a method to explain the "Inquiry Based Science Education" concept	6,61	22,11	34,12	39,35	#SAYI/0!
as a way for better planning of an experiment	3,33	15,45	39,75	43,69	#SAYI/0!
as a channel for guiding students to explain scientific aspects and propose hypothesis for	3,33	26,63	39,57	49,03	#SAYI/0!
as a method to enhance creativity in teaching and learning process	3,33	16,63	41,90	40,36	#SAYI/0!
	% Never	% Slightly	% Moderate	% Quite	% Completely



- % 49,03 of the prospective teachers believe that ICT tools are quite important as a channel for guiding students to explain scientific aspects and propose hypothesis for investigation

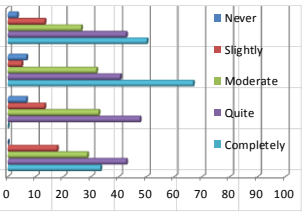
- % 43,69 of the prospective teachers believe that ICT tools are quite important as a way for better planning of an experiment

Question no. 15:

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

Results diagram is presented below:

as a method to increase students' motivation	3,33	13,26	26,38	42,58	50,00
as a method to make learning content more attractive (by using virtual environments and	6,67	4,95	31,86	40,39	66,67
as a way to make students more emotional (by connecting them)	6,61	13,17	32,69	47,53	#SAYI/0!
as a method to promote creativity based on collaborative work	0,00	17,71	28,57	42,62	33,33
	% Never	% Slightly	% Moderate	% Quite	% Completely



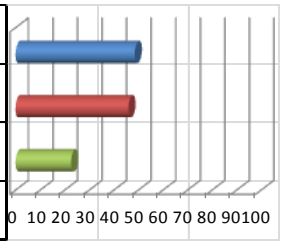
- % 66,67 of the prospective teachers consider collaboration using ICT for teaching Science/Nano-Tech topics as a method to make learning content more attractive (by using virtual environments and multimedia tools)
- % 50 of the prospective teachers consider collaboration using ICT for teaching Science/Nano-Tech topics as a method to increase students' motivation as well as a way to make students more emotional (by connecting them).

Question no. 16:

From where do you find examples for the Nano-Tech experiments for your preparation?

Results diagram is presented below:

From real life	48,52
From Internet (WWW Space), please specify some sources:	45,93
From educational CDs/DVDs, please name some titles:	22,59
They are produced by myself, please provide further details:	2,22



- % 48,52 of the prospective teachers find examples for the Nano-Tech experiments for their preparation from real life.
- % 45,93 of the prospective teachers find examples for the Nano-Tech experiments for their preparation from internet.

Report on the Results gathered from the Evaluation Questionnaire for Prospective Teachers in Romania

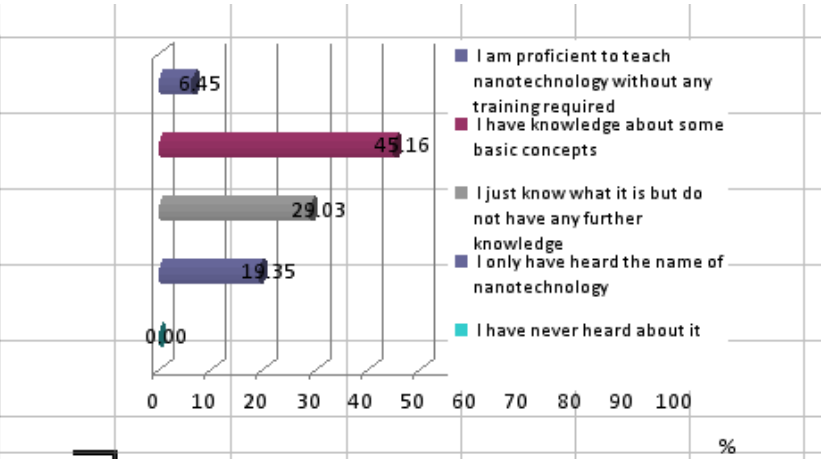
Number of questioned prospective teachers: 31 – prospective teachers with advance Sciences knowledge: Chemistry and Physics specializations (1st, 2nd and 3rd year of study) – May/June 2011.
Questionnaire data processed by: Laura Monica GORGHIU and Gabriel GORGHIU (Valahia University Targoviste, Romania) - June/July 2011.

Question no. 1:

- How would you describe your knowledge about Nanotechnology?

Results diagram is presented below:

	%
I am proficient to teach nanotechnology without any training required	6.45
I have knowledge about some basic concepts	45.16
I just know what it is but do not have any further knowledge	29.03
I only have heard the name of nanotechnology	19.35
I have never heard about it	0.00
Total	

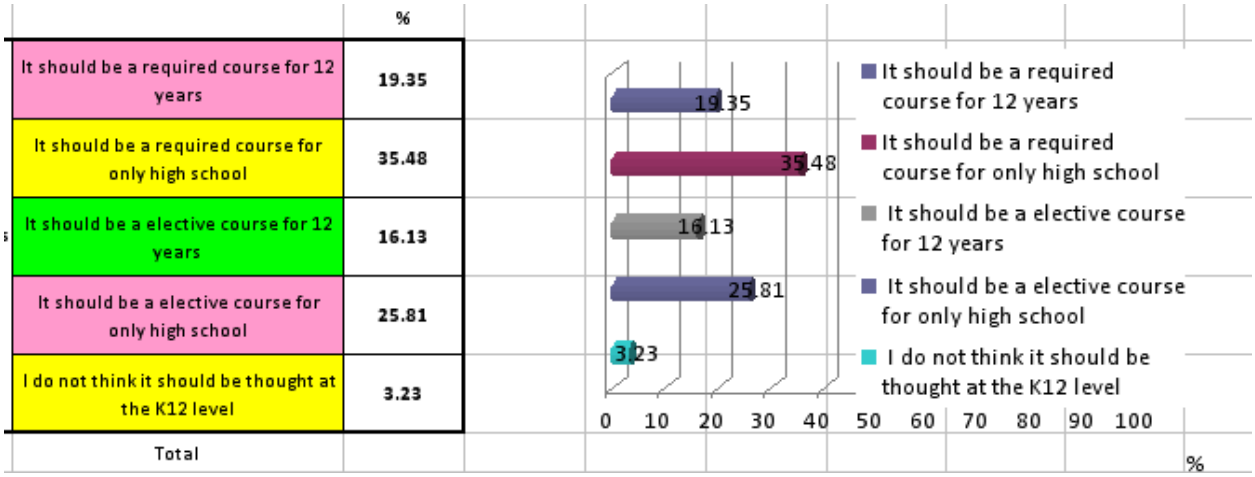


- 45.16% of prospective teachers consider that they have knowledge about some basic concepts.
- just 6.45% of prospective teachers consider that they are proficient to teach nanotechnology without any training required.

Question no. 2:

- What do you think about teaching the emerging Sciences (i.e Nanotechnology) to K12 students?

Results diagram is presented below:



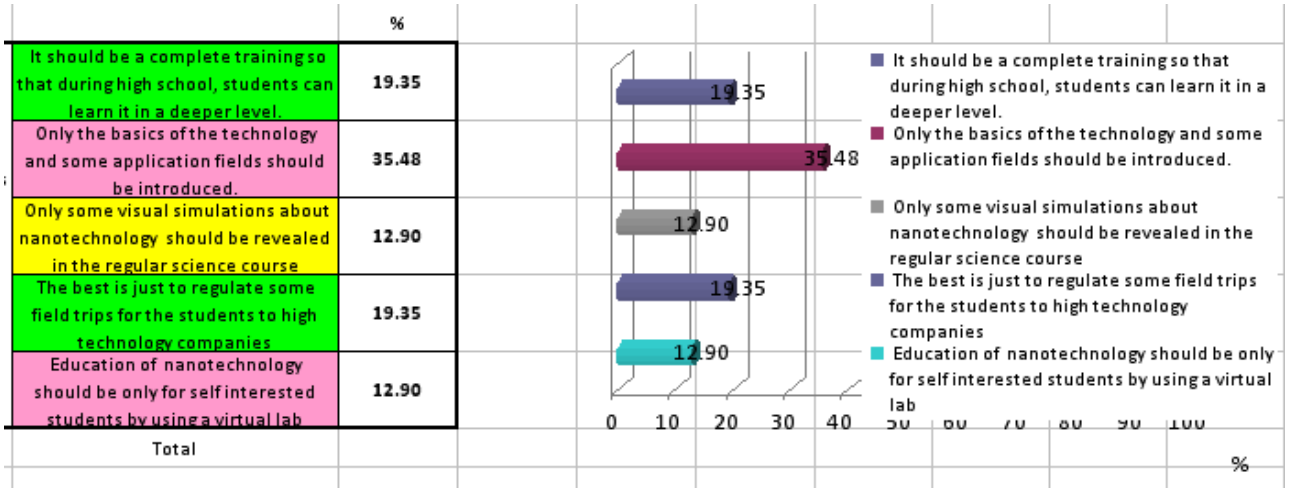
- 35.48% of prospective teachers consider that emerging Sciences (like Nanotechnology) should be a required course for high school students.

- just 3.23% of prospective teachers consider that emerging Sciences (like Nanotechnology) should not be taught at K12 level.

Question no. 3:

- If Nanotechnology is taught, what should be the level for elementary school students?

Results diagram is presented below:



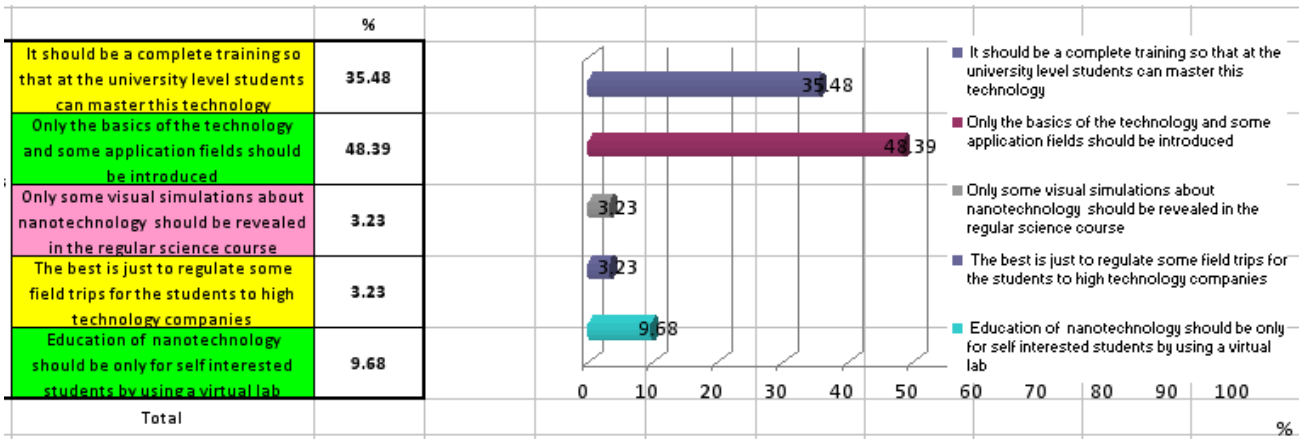
- 35.48% of prospective teachers consider that only the basics of the Technology and some application fields should be introduced for elementary school students.

- 12.90% of prospective teachers consider that only some visual simulations about Nanotechnology should be revealed in the regular science course for elementary school students, and also education of Nanotechnology should be only for self-interested elementary school students by using a Virtual Lab.

Question no. 4:

- If Nanotechnology is taught, what should be the level for high school students?

Results diagram is presented below:



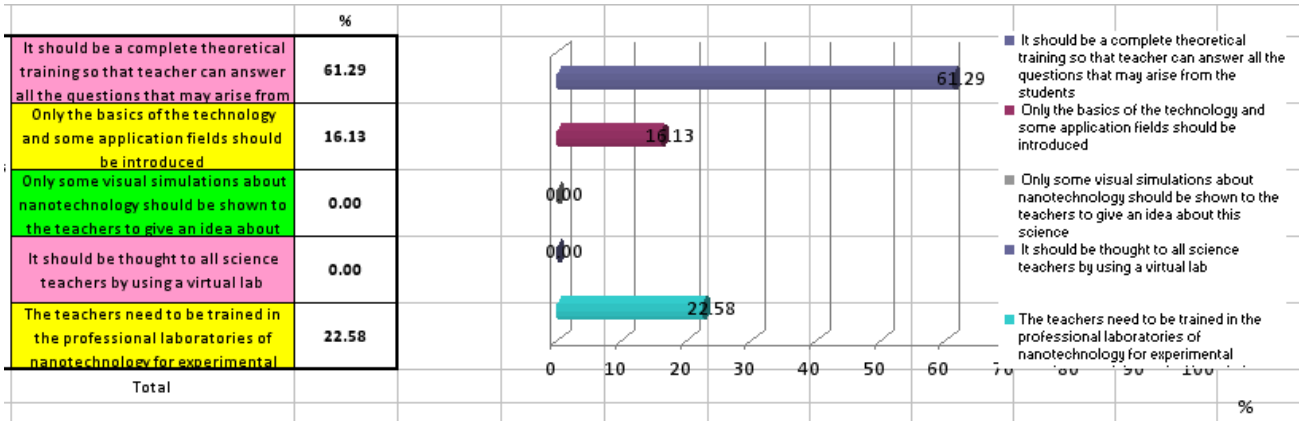
- 48.39% of prospective teachers consider that only the basics of the Technology and some application fields should be introduced for high school students.

- 3.23% of prospective teachers consider that only some visual simulations about Nanotechnology should be revealed in the regular science course for high school students, and also they admit as a suitable channel to organise (on a regular basis) some field trips (for high school students) to high-tech companies.

Question no. 5:

- If Nanotechnology is taught to the science teachers, what would be the level?

Results diagram is presented below:



- 61.29% of prospective teachers consider that it should be a complete theoretical training, so that teacher can answer all the questions that may arise from the students.

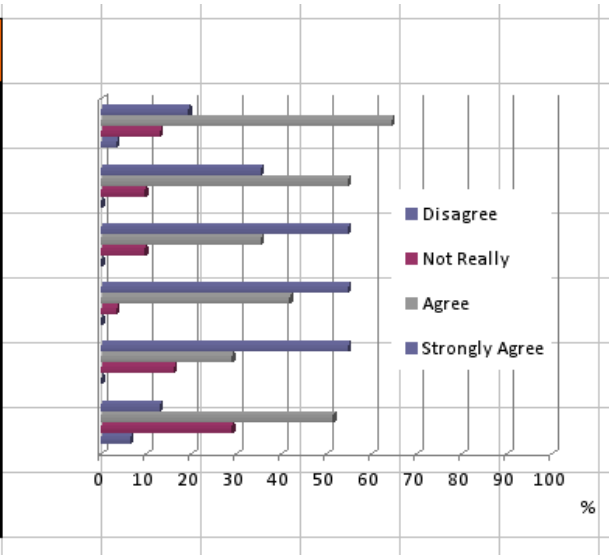
- No one of prospective teachers consider that only some visual simulations about Nanotechnology should be shown to the teachers to give an idea about it, and also no one of prospective teachers consider that it should be taught to all Science teachers just by using a Virtual Lab.

Question no. 6:

- The most effective way to teach a scientific topic in general is...

Results diagram is presented below:

	Disagree	Not Really	Agree	Strongly Agree
Formal lessons	3.23	12.90	64.52	19.35
Reading textbooks	0.00	9.68	54.84	35.48
Watching clips and documentaries	0.00	9.68	35.48	54.84
Interactive computer based tools	0.00	3.23	41.94	54.84
Experiments	0.00	16.13	29.03	54.84
Less structured experiments	6.45	29.03	51.61	12.90
Total	1.61	13.44	46.24	38.71



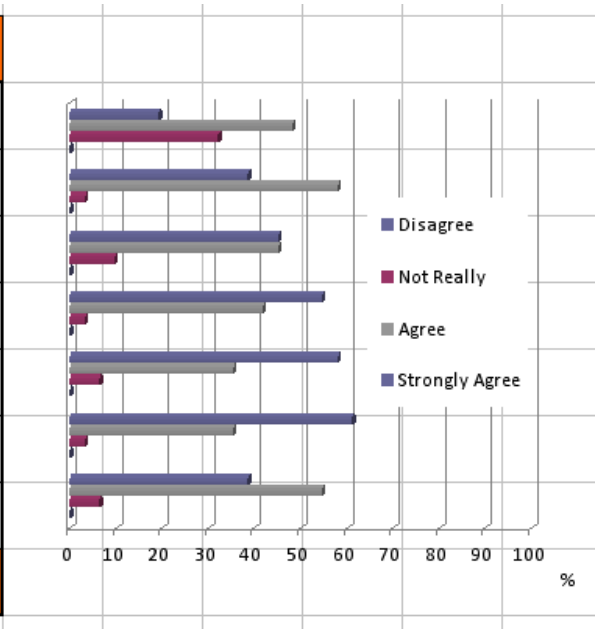
- 54.84% of prospective teachers strongly agree to watch video-clips and documentaries, to use interactive computer based tools and to use experiments in the teaching process.

Question no. 7:

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

Results diagram is presented below:

	Disagree	Not Really	Agree	Strongly Agree
Texts	0.00	32.26	48.39	19.35
Images	0.00	3.23	58.06	38.71
Video	0.00	9.68	45.16	45.16
Simulations	0.00	3.23	41.94	54.84
Interactive simulations	0.00	6.45	35.48	58.06
Procedures to carry out experiments with the students	0.00	3.23	35.48	61.29
Resource library	0.00	6.45	54.84	38.71
Total	0.00	9.22	45.62	45.16



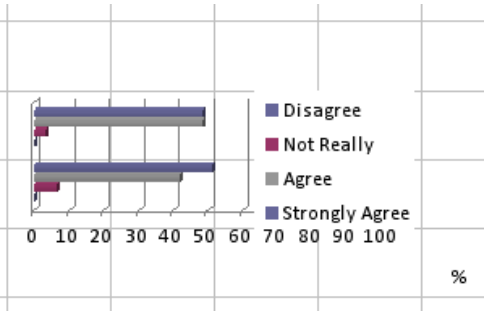
- 61.29% of prospective teachers strongly agree that clear procedures to carry out experiments with students are important for an on-line Virtual Lab.
- also 58.06% and 54.84% of prospective teachers strongly agree that interactive simulations and simulations are important for an on-line Virtual Lab

Question no. 8:

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

Results diagram is presented below:

	Disagree	Not Really	Agree	Strongly Agree
Cook-book type laboratory activities (step-by step instructions) to verify scientific facts.	0.00	3.23	48.39	48.39
Inquiry-based laboratory activities (students decide how to conduct the activity, and have to explore in order	0.00	6.45	41.94	51.61
Total	0.00	4.84	45.16	50.00



- 51.61% of prospective 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.

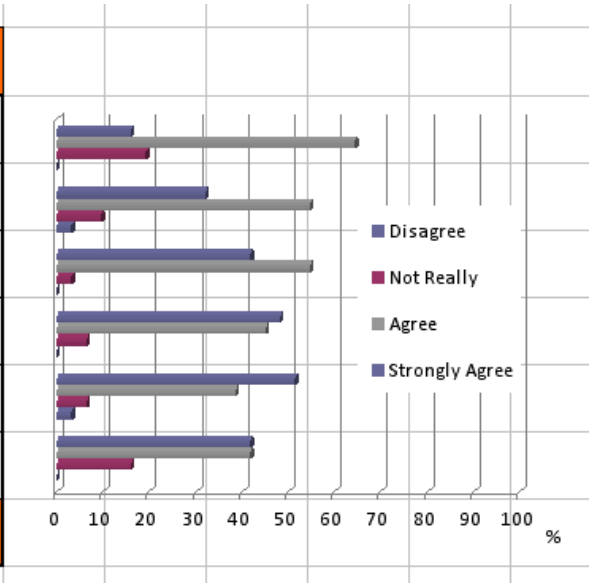
- also 48.39% of prospective teachers strongly agree that cook-book type laboratory activities (step-by step instructions - to verify scientific facts) represent a proper option for an on-line Virtual Lab.

Question no. 9:

- What do you think that the regarding activities in a laboratory would be?

Results diagram is presented below:

	Disagree	Not Really	Agree	Strongly Agree
Students should be engaged by scientifically oriented questions.	0.00	19.35	64.52	16.13
Students should have (be provided) the ability to determine what data allows them to develop and	3.23	9.68	54.84	32.26
Students should have (be provided) the ability to formulate their own explanations from the evidence they	0.00	3.23	54.84	41.94
Students should have (be provided) the ability to expand upon their findings and relate those findings to	0.00	6.45	45.16	48.39
Students should be able to access to the experiments on-line that cannot be done in a laboratory	3.23	6.45	38.71	51.61
Students should have (be provided) the ability to communicate their experimental findings to others in	0.00	16.13	41.94	41.94
Total	1.08	10.22	50.00	38.71



- 51.61% of prospective teachers strongly agree that students should be able to access the on-line experiments that cannot be done in a laboratory.

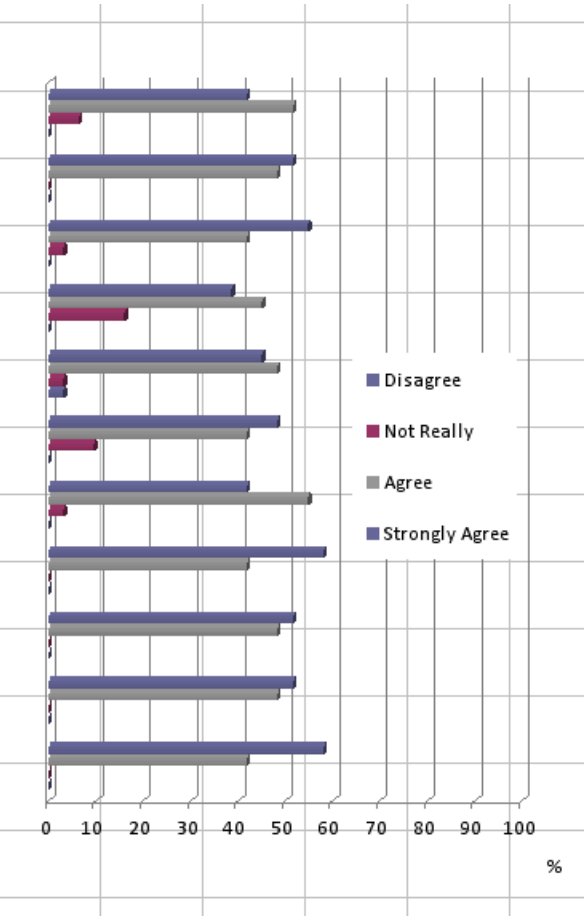
- also 48.39% of prospective teachers strongly agree that students should have (be provided) the ability to expand upon their findings and relate those findings to similar situations.

Question no. 10:

- If you were to create your own laboratory, the students should be able to?

Results diagram is presented below:

	Disagree	Not Really	Agree	Strongly Agree
Make observations.	0.00	6.45	51.61	41.94
Pose questions.	0.00	0.00	48.39	51.61
Have access to an e-Library (other sources of information).	0.00	3.23	41.94	54.84
Plan investigations.	0.00	16.13	45.16	38.71
Reviewing what is already known in light of experimental evidence.	3.23	3.23	48.39	45.16
Use (virtual) tools to gather, analyze and interpret data.	0.00	9.68	41.94	48.39
Propose answers, explanations, and predictions.	0.00	3.23	54.84	41.94
Communicate the results.	0.00	0.00	41.94	58.06
Identify assumptions.	0.00	0.00	48.39	51.61
Use critical and logical thinking.	0.00	0.00	48.39	51.61
Consider alternative explanations.	0.00	0.00	41.94	58.06
Total	0.29	3.81	46.63	49.27



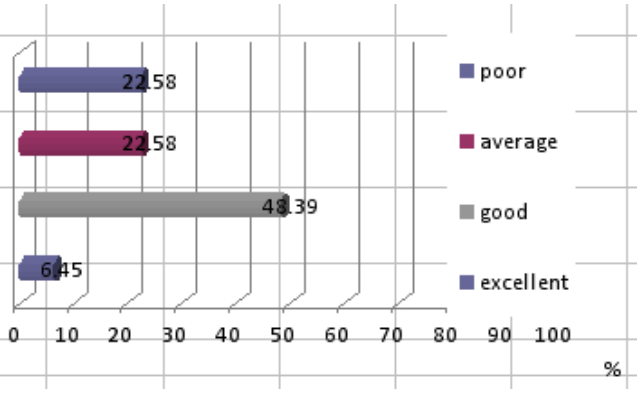
- 58.06% of prospective teachers strongly agree that students should be able to communicate the experimental results and to consider alternative explanations.
- also 54.84% of prospective teachers strongly agree that students should be able to have access to an e-library and to consult other sources of information.

Question no. 11:

- To what extent do you know to use ICT tools for teaching Science/Nano-Tech topics?

Results diagram is presented below:

	%
poor	22.58
average	22.58
good	48.39
excellent	6.45



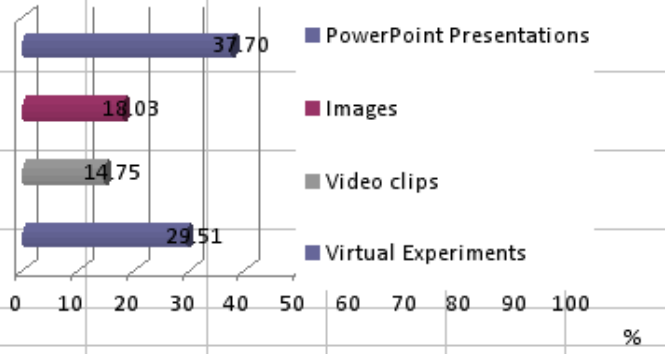
- 48.39% of prospective teachers declare as good their skills and abilities on using ICT tools for teaching Science/Nano-Tech topics.

Question no. 12:

- Which kind(s) of ICT tools do you intend to use for leading Nano-tech experiments in your future lessons?

Results diagram is presented below:

	%
PowerPoint Presentations	37.70
Images	18.03
Video clips	14.75
Virtual Experiments	29.51



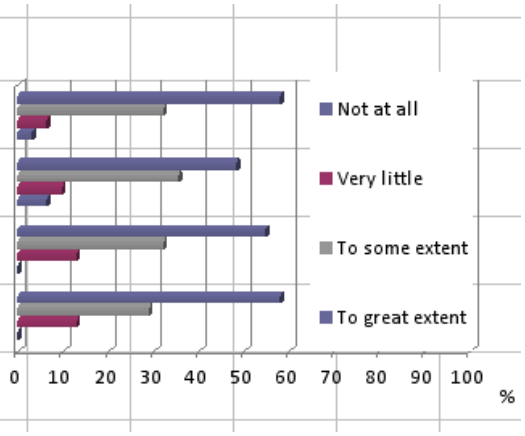
- 37.70% of prospective teachers intend to use PowerPoint presentation for leading Nano-tech experiments in their future lessons.
- also 29.51% of prospective teachers intend to use Virtual Experiments for leading Nano-tech experiments in their future lessons.

Question no. 13:

- Evaluate (on a scale from 1 to 4) how important are ICT tools for you when considering their usefulness for teaching Science/Nano-Tech topics

Results diagram is presented below:

	Not at all	Very little	To some extent	To great extent
as a source of inspiration for you as a future teacher	3.23	6.45	32.26	58.06
as an effective learning environment	6.45	9.68	35.48	48.39
as a method to improve students' learning skills	0.00	12.90	32.26	54.84
as a way for improving students' understanding	0.00	12.90	29.03	58.06
Total	2.42	10.48	32.26	54.84



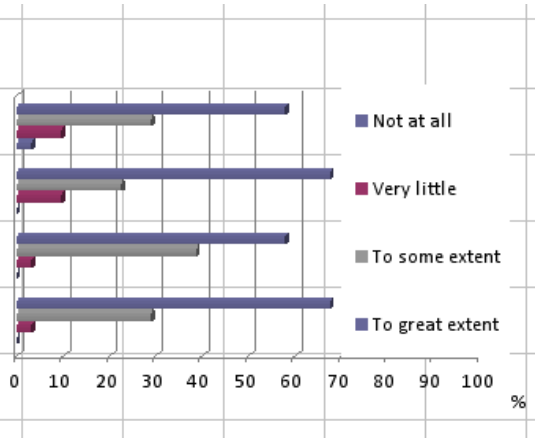
- 58.06% of prospective teachers appreciate (in a great extent) that ICT tools represent a source of inspiration for them as a future teacher and also a way for improving students' understanding, considering the relation between ICT tools and their usefulness for teaching Science/Nano-Tech topics.
- however, 54.84% of prospective teachers appreciate (in a great extent) that ICT tools represent a method for improving students' learning skills, considering the relation between ICT tools and their usefulness for teaching Science/Nano-Tech topics.

Question no. 14:

- 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

Results diagram is presented below:

	Not at all	Very little	To some extent	To great extent
as a method to explain the "Inquiry Based Science Education" concept	3.23	9.68	29.03	58.06
as a way for better planning of an experiment	0.00	9.68	22.58	67.74
as a channel for guiding students to explain scientific aspects and propose hypothesis for	0.00	3.23	38.71	58.06
as a method to enhance creativity in teaching and learning process	0.00	3.23	29.03	67.74
Total	0.81	6.45	29.84	62.90



- 67.74% of prospective teachers appreciate (in a great extent) that ICT tools represent a way for better planning of an experiment and also 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.

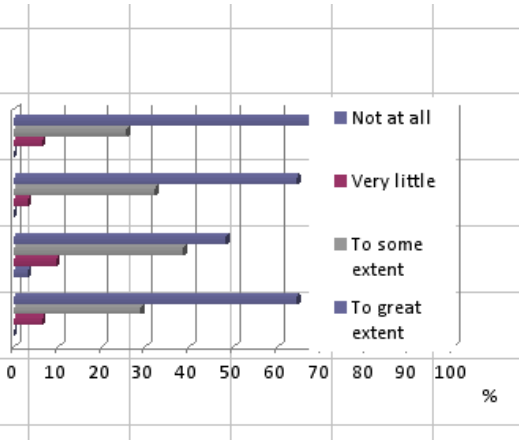
- however, 58.06% of prospective teachers appreciate (in a great extent) that ICT tools represent a method to explain the "Inquiry Based Science Education" concept and also a channel for guiding students to explain scientific aspects and propose hypothesis for investigation, considering the importance of ICT tools to the promoting of inquiry based/creative learning about Science/Nano-Tech topics.

Question no. 15:

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

Results diagram is presented below:

	Not at all	Very little	To some extent	To great extent
as a method to increase students' motivation	0.00	6.45	25.81	67.74
as a method to make learning content more attractive (by using virtual environments and	0.00	3.23	32.26	64.52
as a way to make students more emotional (by connecting them)	3.23	9.68	38.71	48.39
as a method to promote creativity based on collaborative work	0.00	6.45	29.03	64.52
Total	0.81	6.45	31.45	61.29



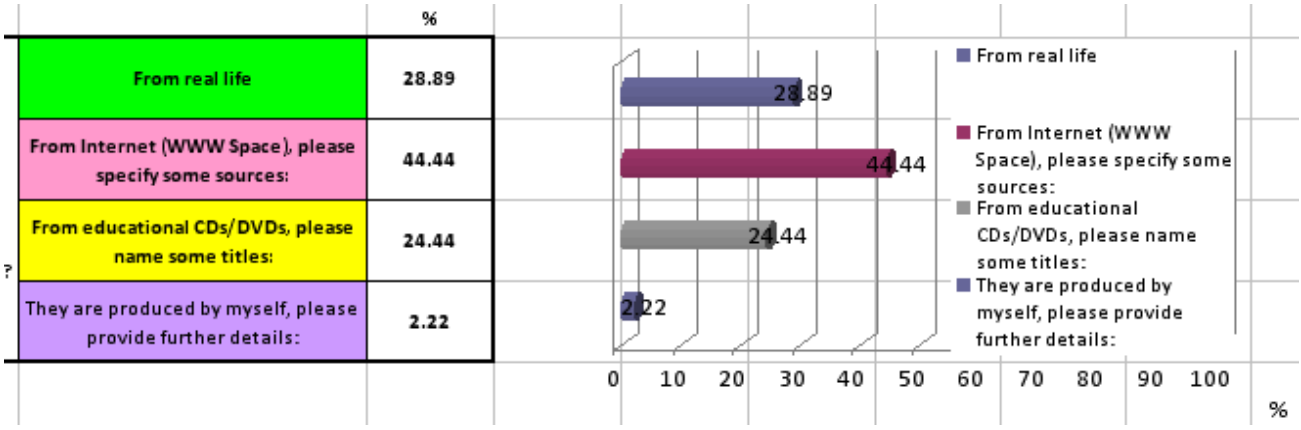
- 67.74% of prospective teachers appreciate (in a great extent) that ICT tools represent a method to increase students' motivation, considering the role of ICT tools for teaching Science/Nano-Tech topics.

- however, 64.52% of prospective 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) and also a method to promote creativity based on collaborative work, considering the role of ICT tools for teaching Science/Nano-Tech topics.

Question no. 16:

- From where do you find examples for the Nano-Tech experiments for your preparation?

Results diagram is presented below:



- 44.44% of prospective teachers use examples for the Nano-Tech experiments (needed to be presented in the classroom) collected / downloaded from Internet (WWW space) – the main accessed website is: http://nanoyou.eu/ (http://nanoyou.eu/en/virtual-lab.html).

- just 2.22% of prospective teachers use examples for the Nano-Tech experiments (needed to be presented in the classroom) produced by themselves.