Report on the Results gathered from the Evaluation Questionnaire for Prospective Teachers (GR)

Number of questioned prospective teachers: 30 – University of Crete, Department of Materials Science and Technology, July-September 2011

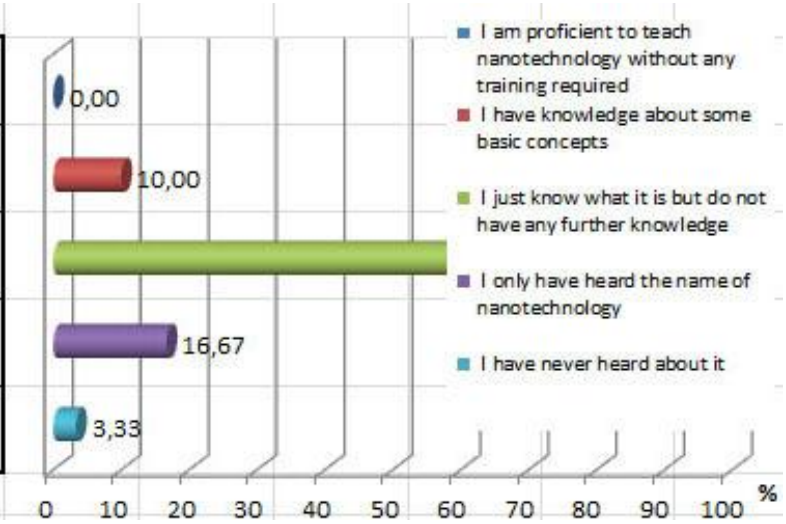
Questionnaire data processed by: Yorgis Androulakis (FORTH / IACM, Greece) - September 2011.

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	0,00
I have knowledge about some basic concepts	10,00
I just know what it is but do not have any further knowledge	70,00
I only have heard the name of nanotechnology	16,67
I have never heard about it	3,33
Total	

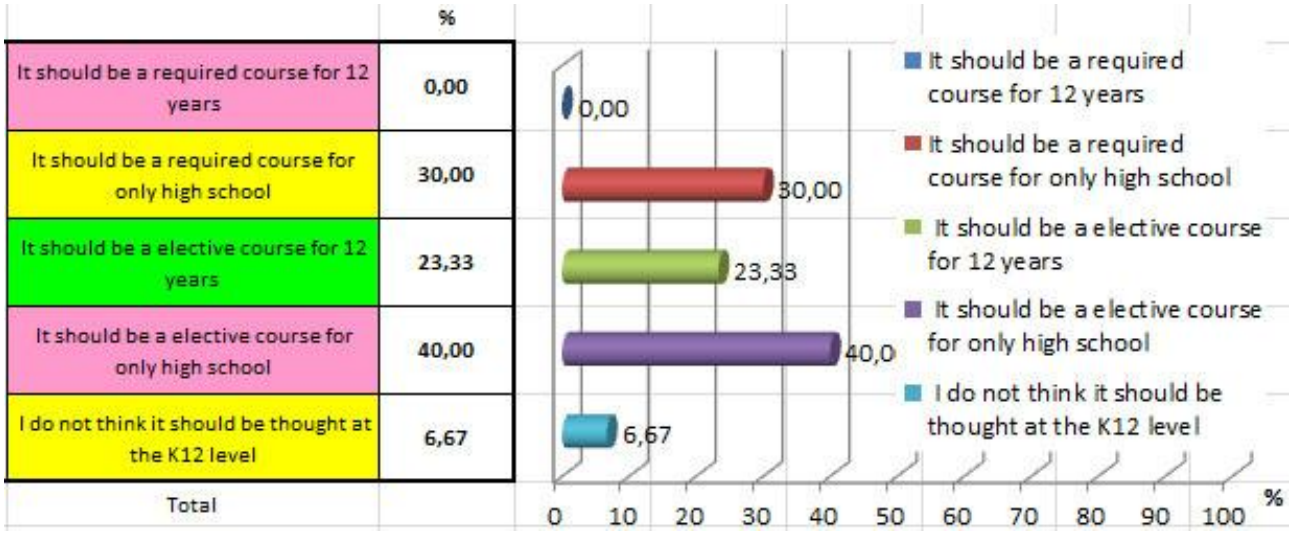


- 70.00% of prospective teachers consider that they know what nano-techit is but do not have any further knowledge.
- 3.33% have never heard about nanotechnology while none of them feels proficient to teach nanotechnology without any training required.

Question no. 2:

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

Results diagram is presented below:



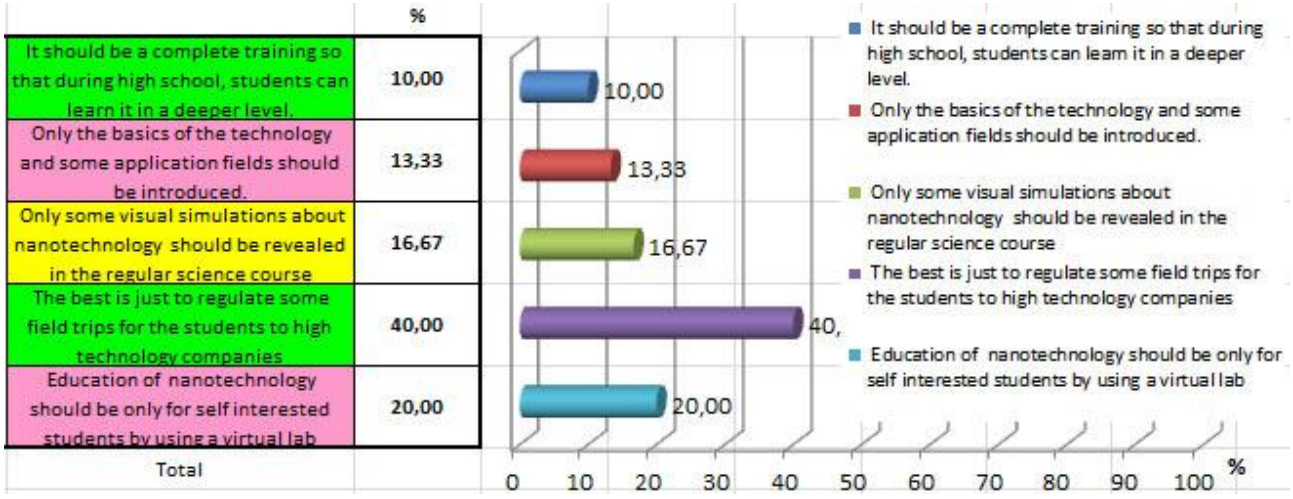
- 70.00% of prospective teachers consider that emerging Sciences (like Nanotechnology) should only be a course for high school students (40.00% elective, 30.00% mandatory)

- None of them believes that emerging Sciences should be a mandatory course for 12 years while 6.67% of them think that emerging Sciences should not be taught at all at the K12 level.

Question no. 3:

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

Results diagram is presented below:



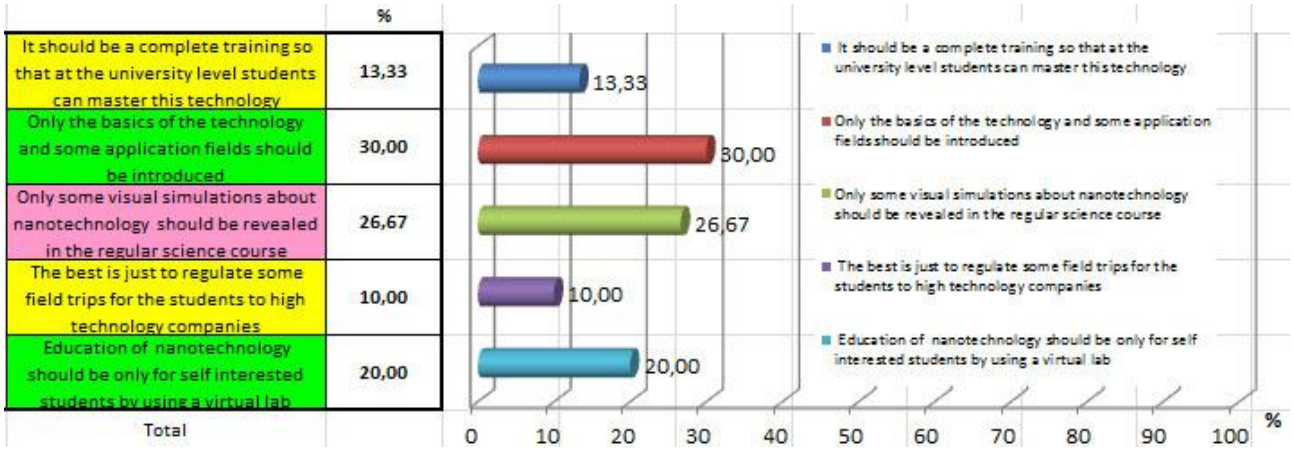
- 40.00% of prospective teachers consider that the best idea is just to organize some field trips for the students to high technology companies.

- Only 10.00% of prospective teachers think that It should be a complete training so that during high school, students can learn it at a deeper level

Question no. 4:

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

Results diagram is presented below:



- 30.00% of prospective teachers consider that only the basics of the Technology and some application fields should be introduced for high school students.

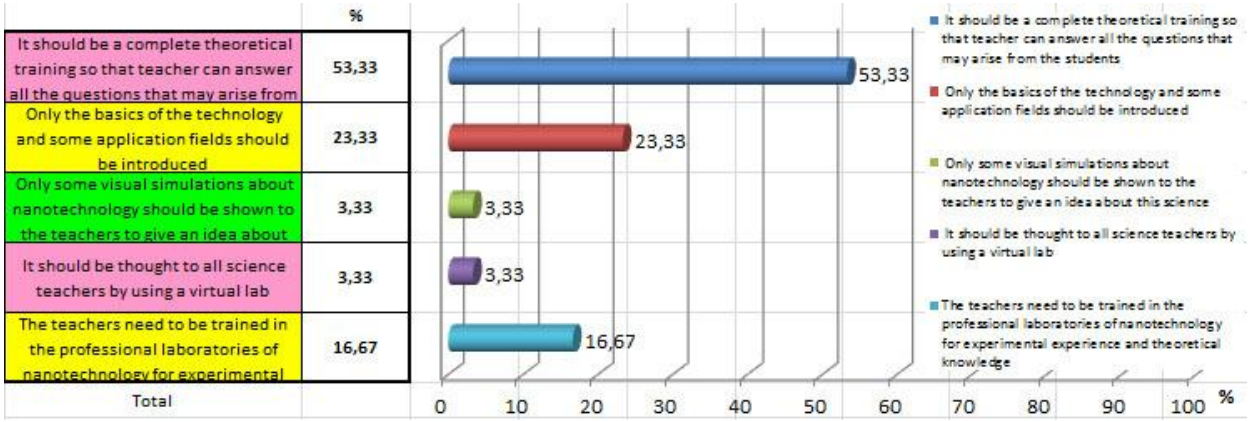
- 26.67% of prospective teachers consider that only some visual simulations about Nanotechnology should be revealed on the regular science course.

- 10.00% of prospective teachers consider that the best thing is to organize 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:



- The majority of prospective teachers (53.33%) consider that it should be a complete theoretical training, so that teachers can answer all the questions that may arise.

- Very few of them (3.33%) consider that only some visual simulations about Nanotechnology should be shown to the teachers to give them an idea about it

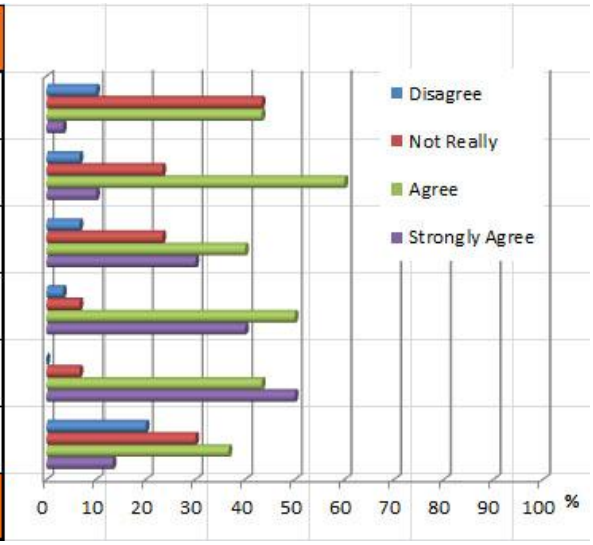
- Very few of them (3.33%) also consider that it should be taught to all Science teachers just by using a Virtual Lab.

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	10,00	43,33	43,33	3,33
Reading textbooks	6,67	23,33	60,00	10,00
Watching clips and documentaries	6,67	23,33	40,00	30,00
Interactive computer based tools	3,33	6,67	50,00	40,00
Experiments	0,00	6,67	43,33	50,00
Less structured experiments	20,00	30,00	36,67	13,33
Total	7,78	22,22	45,56	24,44



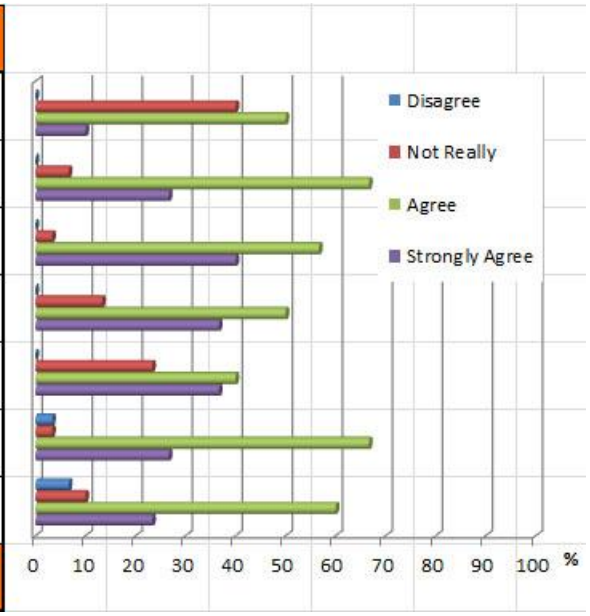
- All ways score very high in categories “Agree” and “Strongly Agree” except the “Formal lessons” and “Less structured experiments” ways that gather more than 50.00% negative scores.
- 9 out of 10 students rate the use of experiments (93.33%) while use of interactive computer based tools scored 90.00% too.

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	40,00	50,00	10,00
Images	0,00	6,67	66,67	26,67
Video	0,00	3,33	56,67	40,00
Simulations	0,00	13,33	50,00	36,67
Interactive simulations	0,00	23,33	40,00	36,67
Procedures to carry out experiments with the students	3,33	3,33	66,67	26,67
Resource library	6,67	10,00	60,00	23,33
Total	1,43	14,29	55,71	28,57



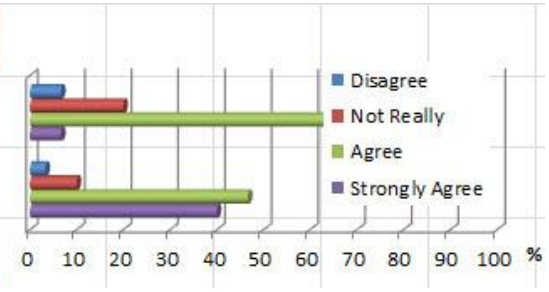
- The majority of the prospective teachers consider all tools important for a virtual lab while the most important tools are:
    - Video (56.67% agree, 40.00% strongly agree)
    - Procedures to carry out experiments with the students (66.67% agree, 26.67% strongly agree)
    - Simulations (50.00% agree, 36.67% strongly agree)
    - Images (66.67% agree, 26,67% strongly agree),
- Texts as a tool score relatively high, in “Not really” field.

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.	6,67	20,00	66,67	6,67
Inquiry-based laboratory activities (students decide how to conduct the activity, and have to explore in order	3,33	10,00	46,67	40,00
Total	5,00	15,00	56,67	23,33



- 40.00% 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.

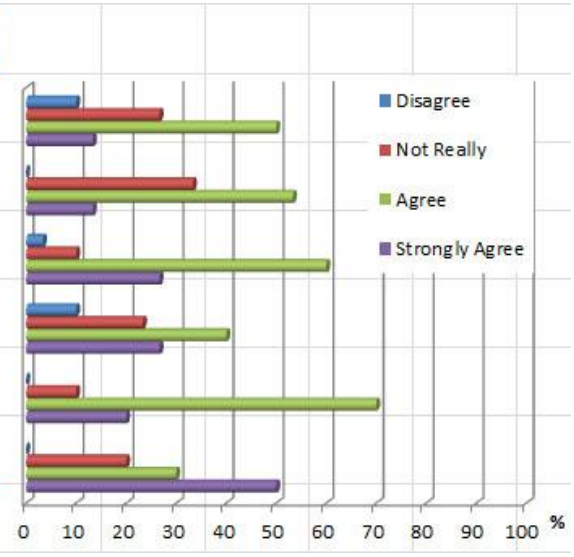
- While 66.67% / 6.67% of them agree / strongly agree that cook-book type laboratory activities (step-by step instructions - to verify scientific facts) represent a proper option for an on-line Virtual Lab 26.67% disagree with this.

Question no. 9:

- **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.	10,00	26,67	50,00	13,33
Students should have (be provided) the ability to determine what data allows them to develop and	0,00	33,33	53,33	13,33
Students should have (be provided) the ability to formulate their own explanations from the evidence they	3,33	10,00	60,00	26,67
Students should have (be provided) the ability to expand upon their findings and relate those findings to	10,00	23,33	40,00	26,67
Students should be able to access to the experiments on-line that cannot be done in a laboratory	0,00	10,00	70,00	20,00
Students should have (be provided) the ability to communicate their experimental findings to others in	0,00	20,00	30,00	50,00
Total	3,89	20,56	50,56	25,00



- In general the majority of prospective teachers are positive / very positive about the proposed activities

- 9 out of 10 of prospective teachers (7 out of 10 agree and 2 out of 10 strongly agree) are in favour of the idea that students should be able to access the on-line experiments that cannot be done in a laboratory (70.00% agree, 20.00% strongly agree).

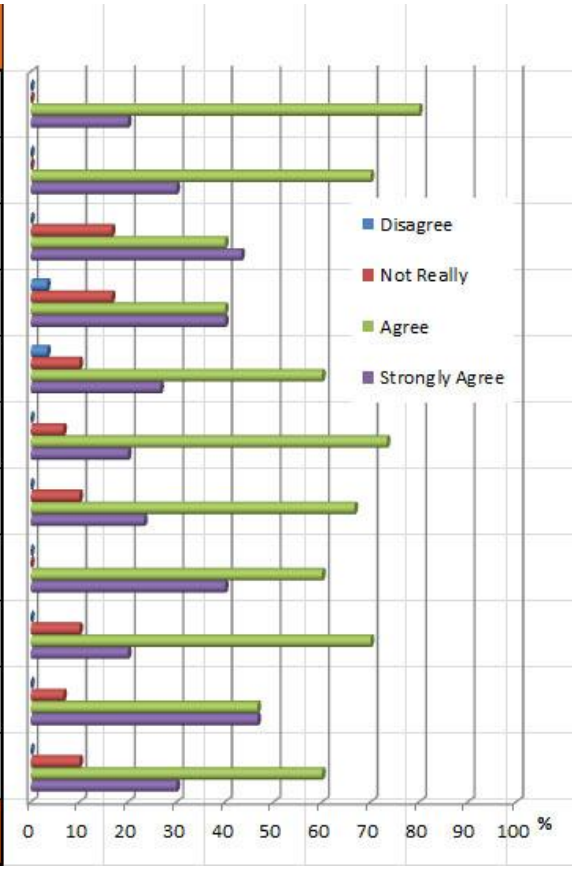
- 8 out of 10 (3 out of 10 agree and 5 out of 10 strongly agree) are positive to the idea that students should have (be provided) with the ability to communicate their experimental findings to others in class via written laboratory reports.

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	0,00	80,00	20,00
Pose questions.	0,00	0,00	70,00	30,00
Have access to an e-Library (other sources of information).	0,00	16,67	40,00	43,33
Plan investigations.	3,33	16,67	40,00	40,00
Reviewing what is already known in light of experimental evidence.	3,33	10,00	60,00	26,67
Use (virtual) tools to gather, analyze and interpret data.	0,00	6,67	73,33	20,00
Propose answers, explanations, and predictions.	0,00	10,00	66,67	23,33
Communicate the results.	0,00	0,00	60,00	40,00
Identify assumptions.	0,00	10,00	70,00	20,00
Use critical and logical thinking.	0,00	6,67	46,67	46,67
Consider alternative explanations.	0,00	10,00	60,00	30,00
Total	0,61	7,88	60,61	30,91

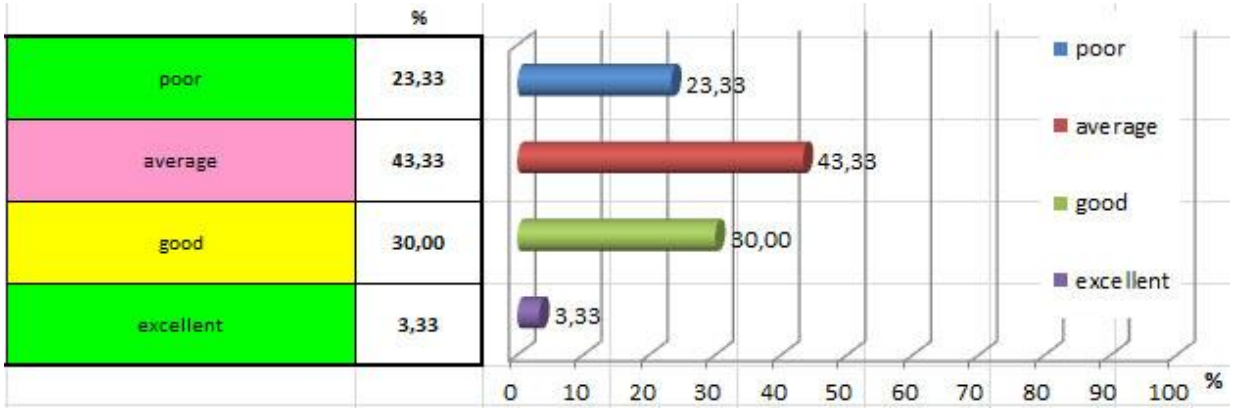


- Again, in general the majority of prospective teachers are positive / very positive to the proposed procedures
- Abilities like students being able to pose questions, make observations and communicate their results score no negative marks.

Question no. 11:

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

Results diagram is presented below:

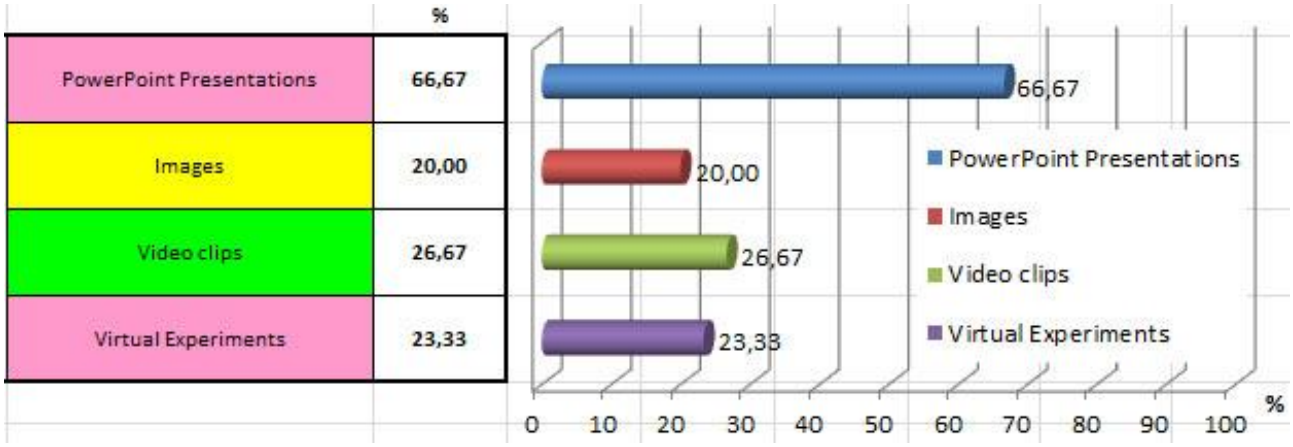


- 43.33% of prospective teachers consider their skills and abilities on using ICT tools for teaching Science/Nano-Tech topics as average.

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:



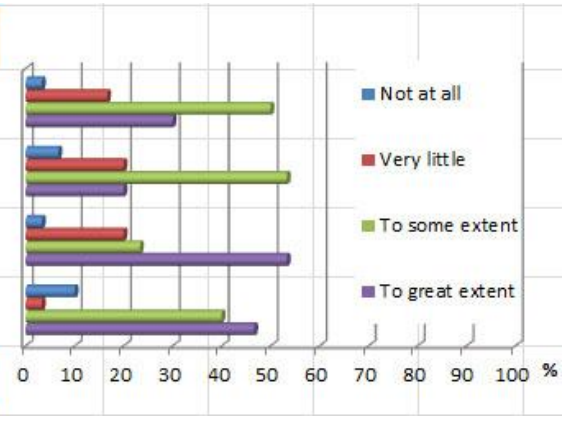
- 2 out of 3 66.67% of prospective teachers intend to use PowerPoint presentation for leading Nano-tech experiments in their future lessons.
- 1 out of five (20.00%) of them intend to use images.

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	3,33	16,67	50,00	30,00
as an effective learning environment	6,67	20,00	53,33	20,00
as a method to improve students' learning skills	3,33	20,00	23,33	53,33
as a way for improving students' understanding	10,00	3,33	40,00	46,67
Total	5,83	15,00	41,67	37,50



- All the proposed ICT tools are considered as important (to some or a greater extent) for teaching science/Nano-tech topics.

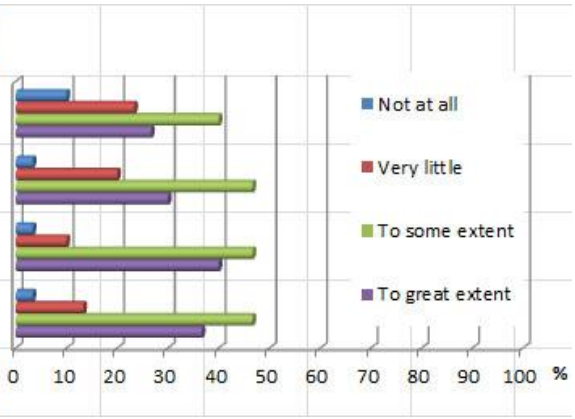
- 46.67% of prospective teachers consider (to a great extent) ICT tools as a way for improving students' understanding while 53.33% of them agree that to a great extent, ICT tools are useful as a method to improve students' learning skills.

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	10,00	23,33	40,00	26,67
as a way for better planning of an experiment	3,33	20,00	46,67	30,00
as a channel for guiding students to explain scientific aspects and propose hypothesis for	3,33	10,00	46,67	40,00
as a method to enhance creativity in teaching and learning process	3,33	13,33	46,67	36,67
Total	5,00	16,67	45,00	33,33



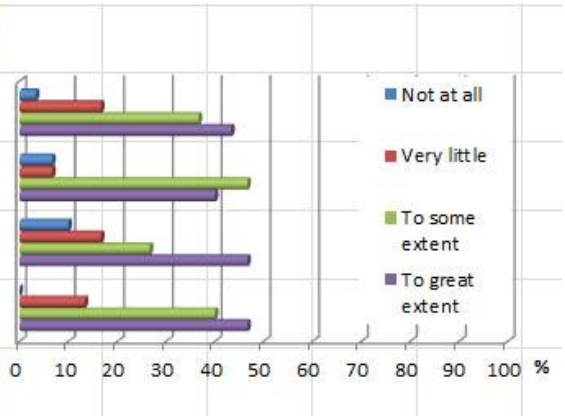
- While all of the proposed ICT tools are considered important or very important to promote the "Enquiry-based learning" concept, the use of ICT tools as a method to explain the "Inquiry Based Science Education" concept get negative marks from 1 out of 3 prospective teachers.

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	3,33	16,67	36,67	43,33
as a method to make learning content more attractive (by using virtual environments and	6,67	6,67	46,67	40,00
as a way to make students more emotional (by connecting them)	10,00	16,67	26,67	46,67
as a method to promote creativity based on collaborative work	0,00	13,33	40,00	46,67
Total	5,00	13,33	37,50	44,17



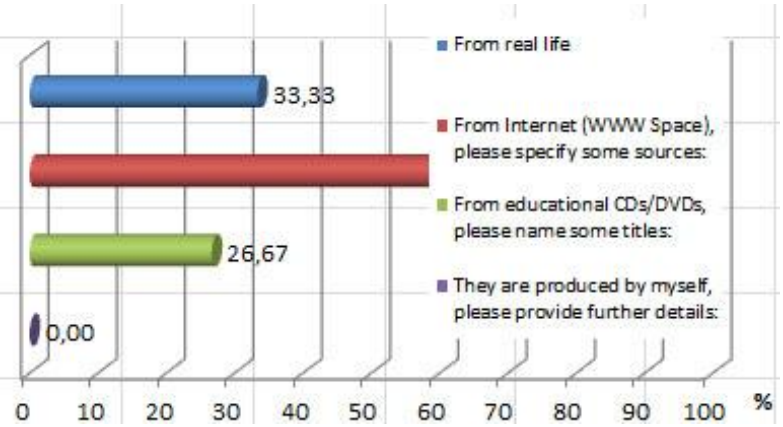
- All of the proposed ICT tools that promote collaboration to some or to a greater extent are considered.
- The great majority of prospective teachers give positive to very positive marks.

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	33,33
From Internet (WWW Space), please specify some sources:	60,00
From educational CDs/DVDs, please name some titles:	26,67
They are produced by myself, please provide further details:	0,00



- 6 out of 10 prospective teachers (60.00%) use the Internet as a source for finding examples of the Nano-Tech experiments. They use Google Search, Wikipedia and related science/nano-tech sites)
- 1 out of 3 of them uses real life examples.
- None of them produces material by themselves.