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Erasmus+

WORLD OF PHYSICS
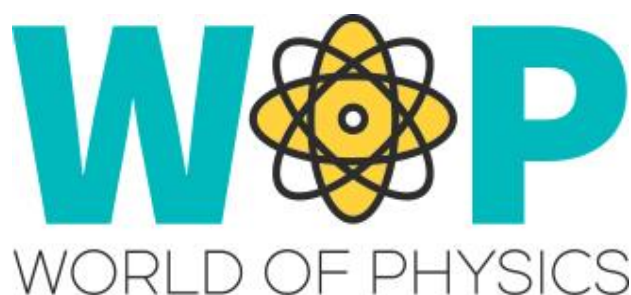
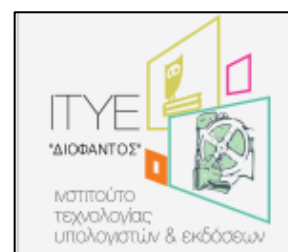|	
Deliverable Number	**Report II**
Deliverable Title	**Piloting Report**
Intellectual Output Title	**Intellectual Output II: Virtual 3D World for Teaching Physics**
Activity description	**The report presents the overall results of the pilot across the partner countries.**
Authors (per company, if more than one company provide it together)	**CTE, New Edu, UCY,**
Status (D: draft; RD: revised draft; F: final)	**F**
Date (versioning)	**15/11/2018**

Partners

University of Cyprus, Cyprus

https://www.cs.ucy.ac.cy/seit/

University of Patras, Greece

http://www.upatras.gr/en

CTE, Romania

http://www.etcenter.eu/index.php/en/

Computer Technology Institute and Press "Diophantus", Greece

http://www.cti.gr/en

ITD-CNR, Italy

https://www.cnr.it/en

NEW EDU, Slovakia

http://www.newedu.sk/

Introduction

The current document contains the analysis of the results from the questionnaires that have been developed under the Project "WORLD OF PHYSICS LEARN / PLAY / HAVE FUN!" (ERASMUS + 2016-1-CY01-KA201-017371). It contains the statistical analysis of the answers to questions addressed in questionnaires that were distributed to the participants to the piloting activities conducted in the project. Its main purpose is to provide a comprehensive feedback regarding the use of the WOP 3D World platform and the learning materials therein. The feedback is used to improve the content, graphics, layout, learning methodologies and user interactivity within the 3D World, following the piloting activities in the project.

The main aim of the WOP project is to assist students in better studying and learning physics with the utilization of new educational technologies. Specifically, a 3D virtual reality educational environment has been developed, possessing innovative educational infrastructure, and offering immersive and efficient learning opportunities, engaging students in various educational activities, learning scenarios and offering students an attractive, entertaining and efficient way to learn various topics of the challenging domain of physics. The students are offered the ability to virtually visit laboratories, perform experiments, explore procedures and phenomena, examine the ways that are conducted and also be guided towards analyzing and explaining them through the scientific method. The virtual educational environment and the laboratories have been designed in a way that offer a support to students to develop appropriate mental models of the concepts involved, by visualizing them and allowing interactions with the virtual phenomena and processes. When students learn new abstract concepts, it is quite hard without appropriate connection to concrete examples. The 3D virtual reality educational environment and the visualization of procedures are aiming to help students to connect abstract concepts and procedures to concrete experiences and examples, including spatial instruction. Also, by teaching the students to study in 3D virtual reality and by using visualization techniques, it is aimed to enhance the spatial cognition.

Piloting Analysis

1. **Gender:**

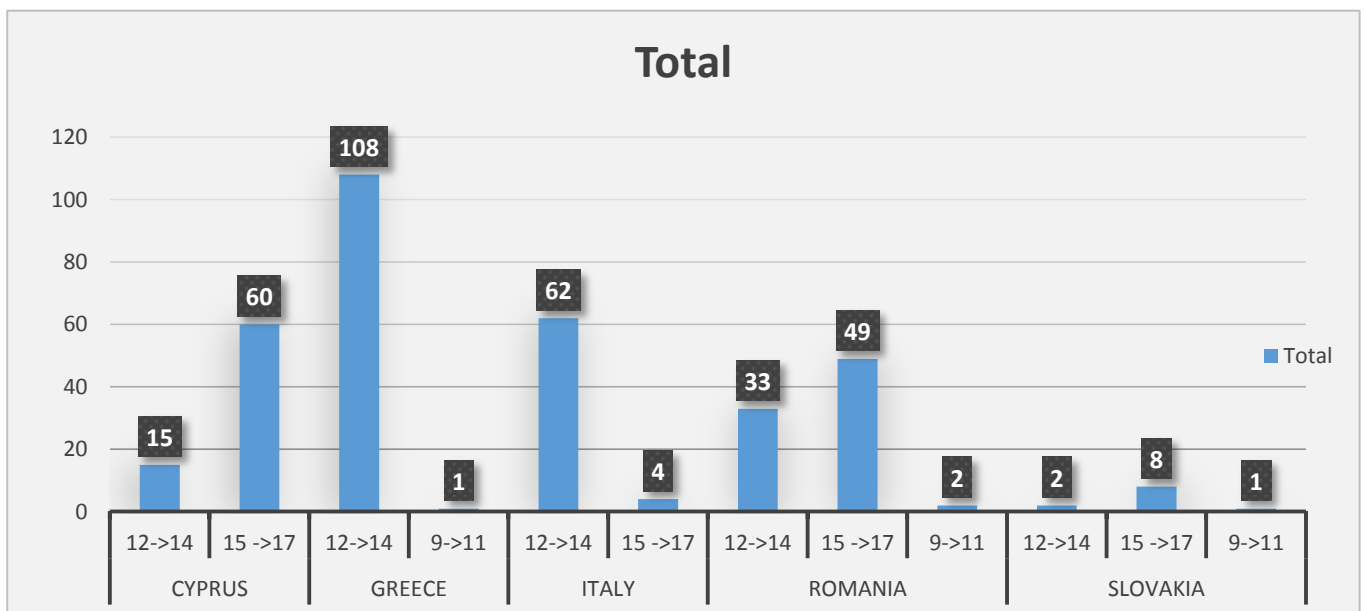|	Count of 1. Gender:
Female	**158**
Cyprus	29
Greece	56
Italy	37
Romania	35
Slovakia	1
Male	**180**
Cyprus	41
Greece	53
Italy	28
Romania	48
Slovakia	10
Prefer not to say	**7**
Cyprus	5
Italy	1
Romania	1
Grand Total	**345**
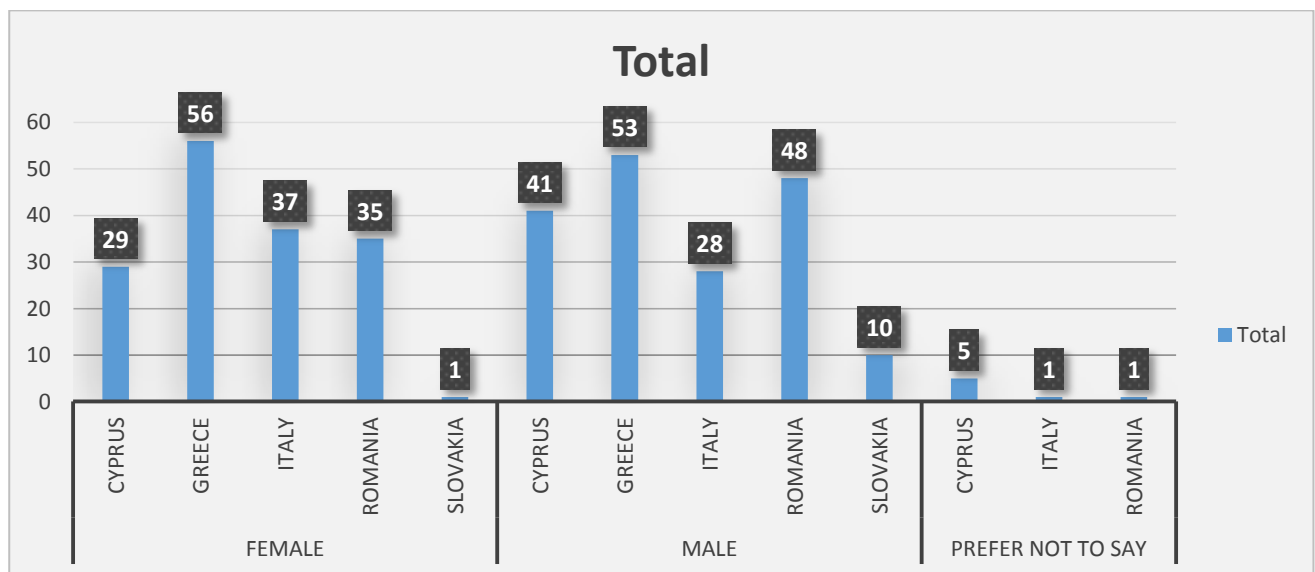
As can be seen from the above data, among the 5 countries involved in the project, of the total number of respondents, 47% are women and 53% are men, the questionnaire being applied equally between the sexes. While in Greece the largest number of male respondents was registered, followed by Italy and Romania, the opposite is Slovakia, which recorded the lowest rate of female representation in the study.

As far as male respondents are concerned, the highest rate of response was recorded in Greece, followed by Romania and Italy, with Slovakia being the opposite.

2. Age Group:

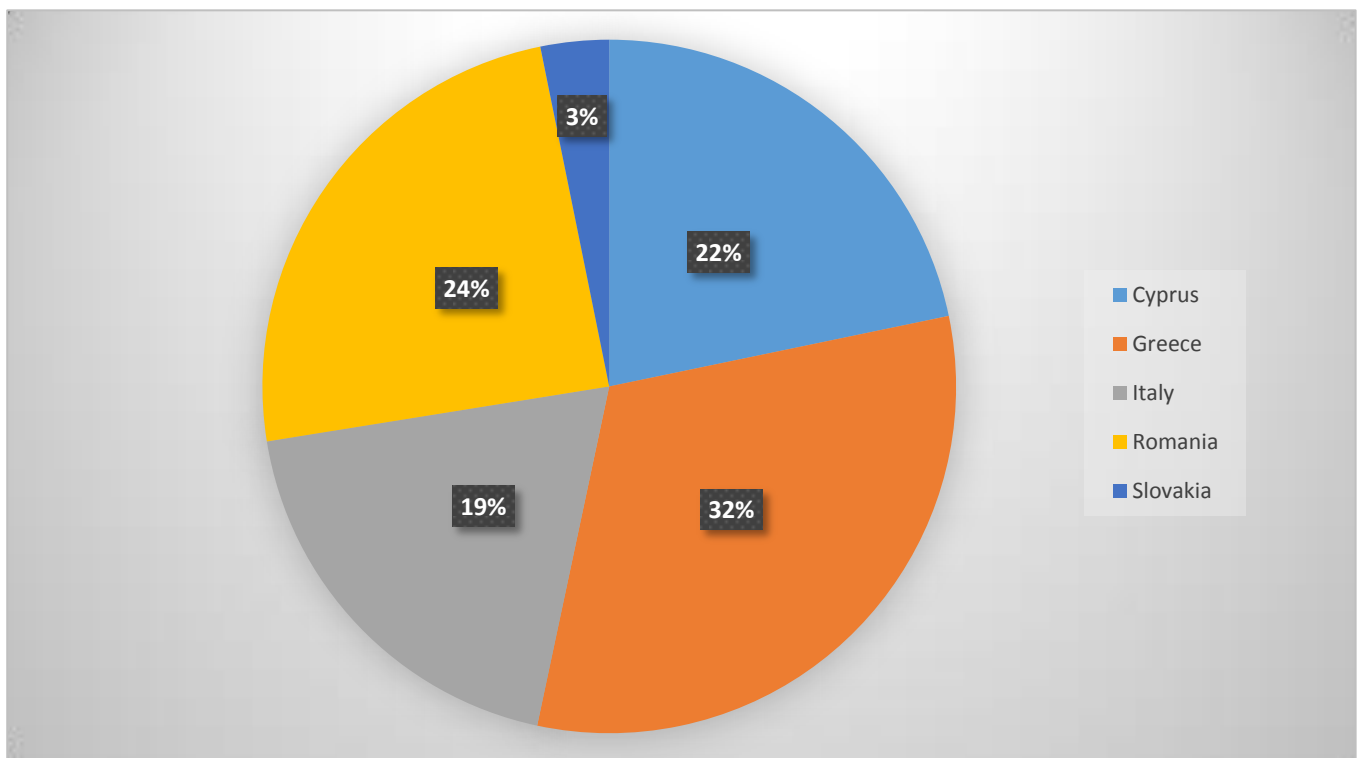|	Count of 4. Rate from 1 to 7 how much you like Physics:
Cyprus	**75**
12->14	15
15 ->17	60
Greece	**109**
12->14	108
9->11	1
Italy	**66**
12->14	62
15 ->17	4
Romania	**84**
12->14	33
15 ->17	49
9->11	2
Slovakia	**11**
12->14	2
15 ->17	8
9->11	1
Grand Total	**345**

At the level of the project, it can be seen that only in Romania and Slovakia piloting was performed on all three age groups (12-> 14; 15 -> 17; 9-> 11), the age group with the highest rate of response being 12-> 14 years group (63%). The group with the lowest response rate was 9-> 11 years (0.01%), 15 -> 17 years group being situated in the middle (36.9%). The preference for the study of physics can be noticed at the group of 12 -> 14

years, the other groups 9 -> 11 years and 15 -> 17 years not showing the same interest for this matter.

3. Participants per Country:

|	Count of 3. Country:
Cyprus	75
Greece	109
Italy	66
Romania	84
Slovakia	11
Grand Total	**345**

Of all the countries involved in the project, Greece is the leader in the number of respondents (109 people), followed by Romania (84) and Cyprus (75), at the opposite being Slovakia (11).

4. Rate from 1 to 7 how much you like Physics:

Count of 4. Rate from 1 to 7 how much you like Physics:	Cyprus	Greece	Italy	Romania	Slovakia	Grand Total
1		2				2
2	1	12	3	6		22
3	1	30	6	11	1	49
4	3	36	7	20	1	67
5	25	21	18	22	2	88
6	29	6	18	15	4	72
7	15	1	14	10	3	43
N/A	1	1				2
Grand Total	**75**	**109**	**66**	**84**	**11**	**345**
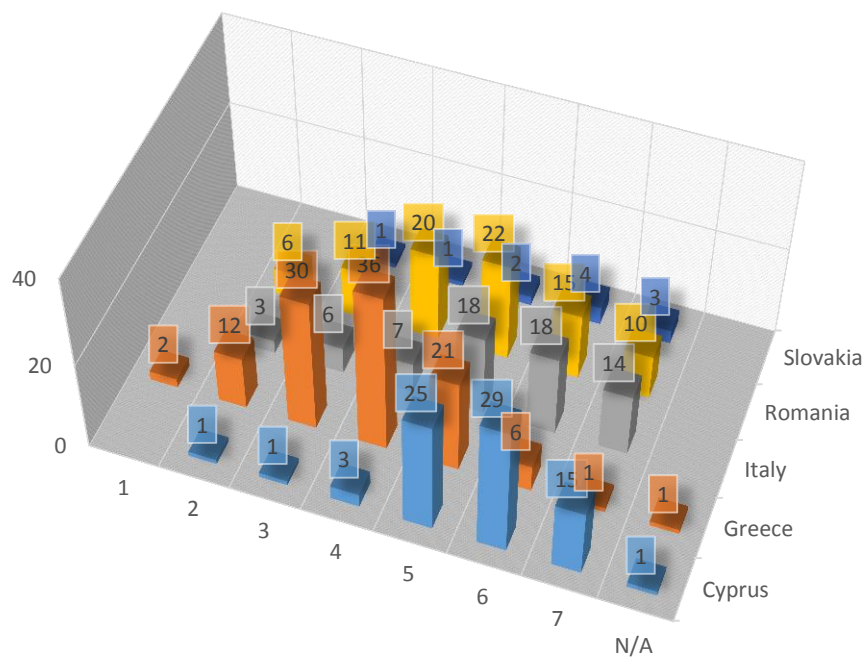
26% of the total respondents said they like to study physics, while 21% have a fairly high interest in this subject, and only 19% are neither excited nor disliked by the study of physics.

We notice an increased interest in the study of physics (69 positive responses), Italy (50 positive responses) and Romania (47 positive responses).

Greece has the highest moderate interest rate among all countries in the project.

5. Rate from 1 to 7 how much you'd like to attend/participate in a physics event or competition:

| Count of 5. Rate from 1 to 7 how much you'd like to attend/participate in a physics event or competition:									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**N/A**	**Grand Total**
Cyprus	5	10	8	15	21	8	7	1	75
Greece		5	13	25	30	26	10		109
Italy	4	9	1	16	13	14	9		66
Romania		6	4	23	29	18	4		84
Slovakia			1	2	3	3	2		11
Grand Total	**9**	**30**	**27**	**81**	**96**	**69**	**32**	**1**	**345**
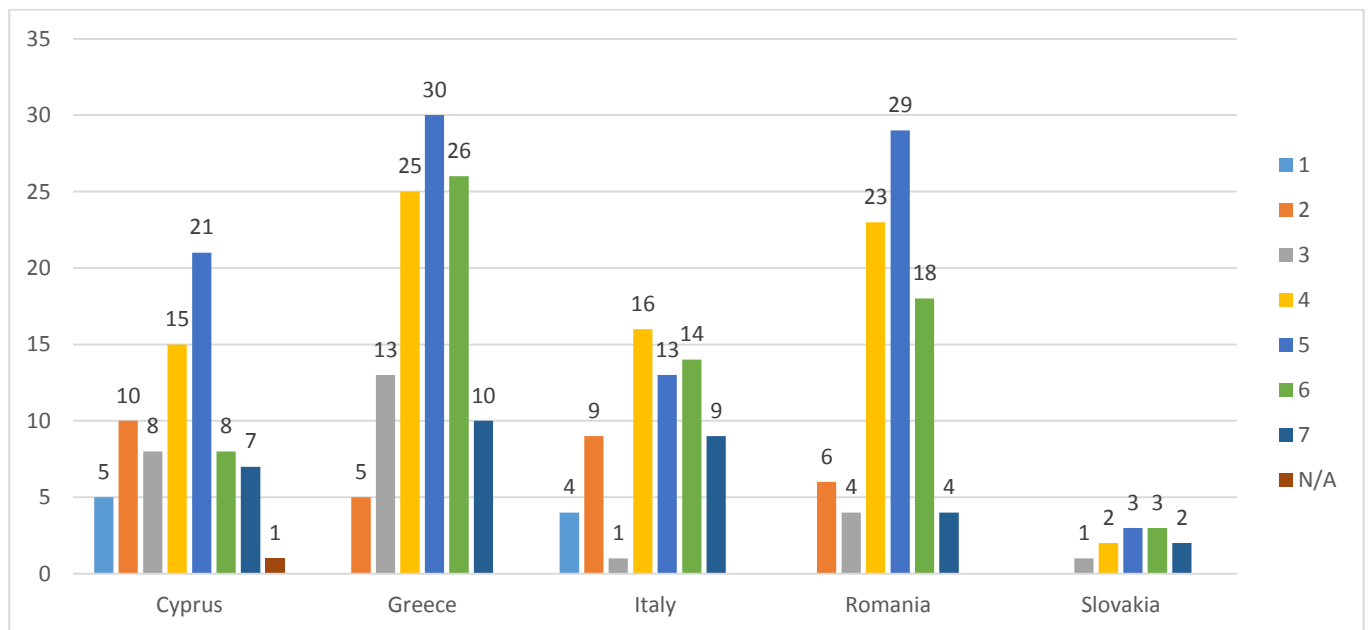
28% of the total number of respondents show increased interest in attending physics events or competitions, while 20% wish to participate in events and 10% strongly want to participate. On the opposite side, only 3% rejected the idea of participating in competitions, 9% were very uninterested and 8% were slightly more interested.

Of the total number of respondents in all countries, most respondents in Greece (31%) were strongly interested in participating in competitions, followed by Romania (28%).

6. Rate from 1 to 7 how much you would like to attend the Nasa "Meet an Astronaut" event:

| Count of 6. Rate from 1 to 7 how much you would like to attend the Nasa "Meet an Astronaut" event:									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**N/A**	**Grand Total**
Cyprus	1	2	4	4	9	16	38	1	75
Greece				2	18	35	54		109
Italy	3			2	1	11	11	38	66
Romania			1	6	18	23	36		84
Slovakia			1	1	3	2	4		11
Grand Total	**4**	**2**	**8**	**14**	**59**	**87**	**170**	**1**	**345**
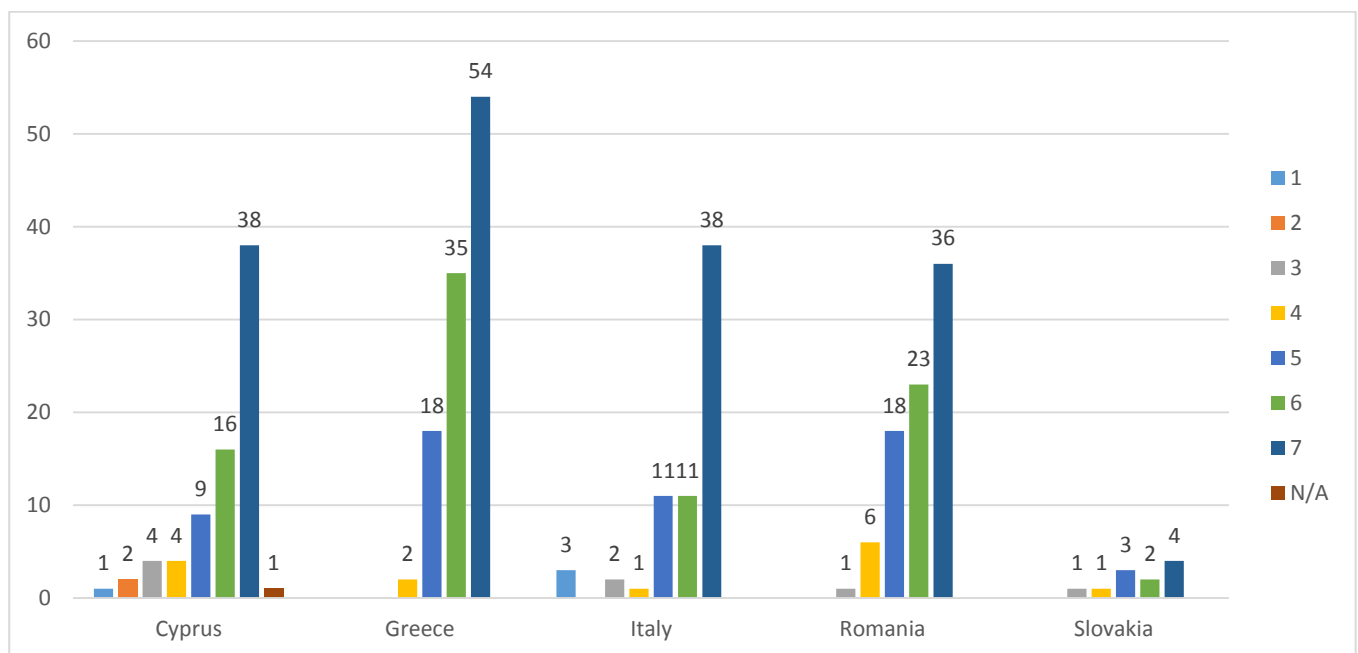
Of the total of respondents in all five countries, 50% were very excited to attend the event and only 1% showed total disinterest. Of all the countries, Greece had the highest interest rate, while Italy had the highest rate of total disinterest. Romania had the highest rate of moderate interest in attending the event.

7. Rate from 1 to 7 how much you would like compete in the annual Physics Olympics:

Count of 7. Rate from 1 to 7 how much you would like compete in the annual Physics Olympics:								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**N/A**	**Grand Total**
Cyprus	15	10	13	13	13	7	3	1	75
Greece			4	28	25	24	28		109
Italy	9	5	7	11	7	17	10		66
Romania	6	3	11	18	16	23	7		84
Slovakia	1		2	4		3	1		11
Grand Total	**31**	**18**	**37**	**74**	**61**	**74**	**49**	**1**	**345**
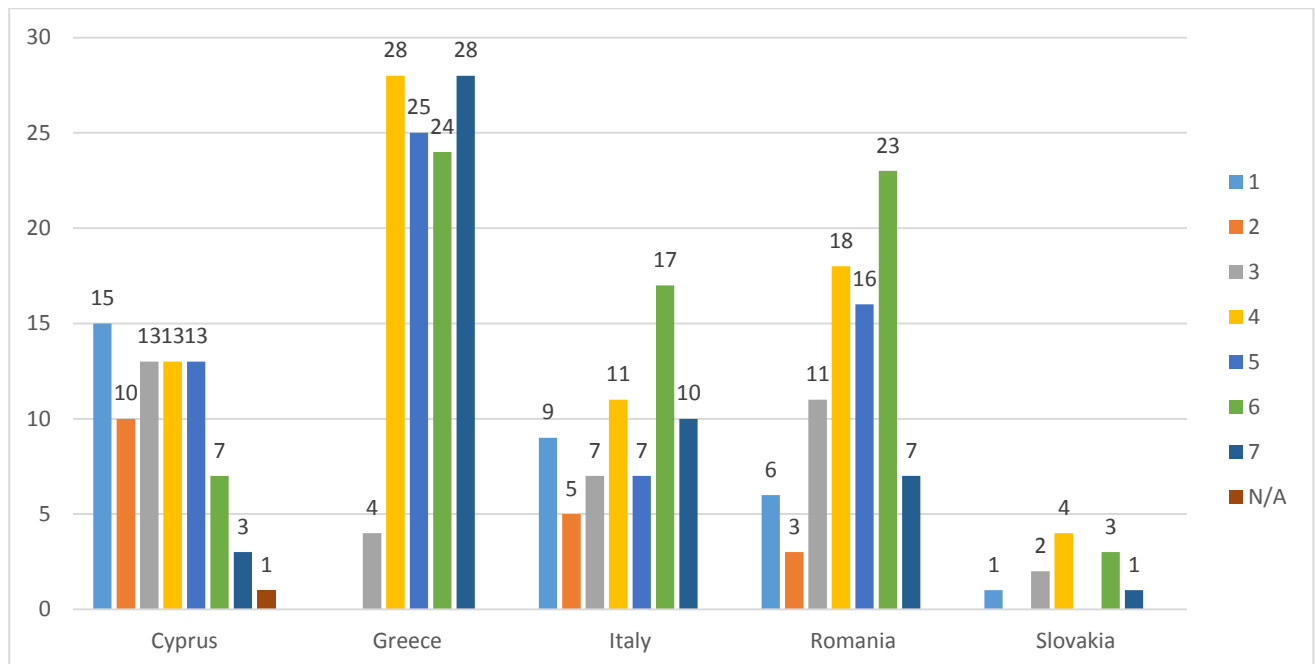
As can be seen from the above table, 21% of the total respondents have shown an increased interest in attending the annual Physics Olympics and 21% said they are indifferent, but they do not particularly want to participate.

At the country level, most respondents interested in were in Greece (57%), while in Slovakia they were the least interested 3%. In Italy there is an almost uniform distribution of responses.

In Romania there is noticed an interest in participating at the Olympics, 19% of respondents claiming they want to participate, 27% want a lot and only 8% are convinced they want to participate.

In Cyprus, moderate interest in olympics is noted, 17% of respondents being uninterested, 17% disinterested, but not interested, and 17% more interested.

8. A 7-point Likert scale ranging from 1 to 7 is used to evaluate how often you play videogames and which types of videogames you prefer.

    a. How often do you play videogames?

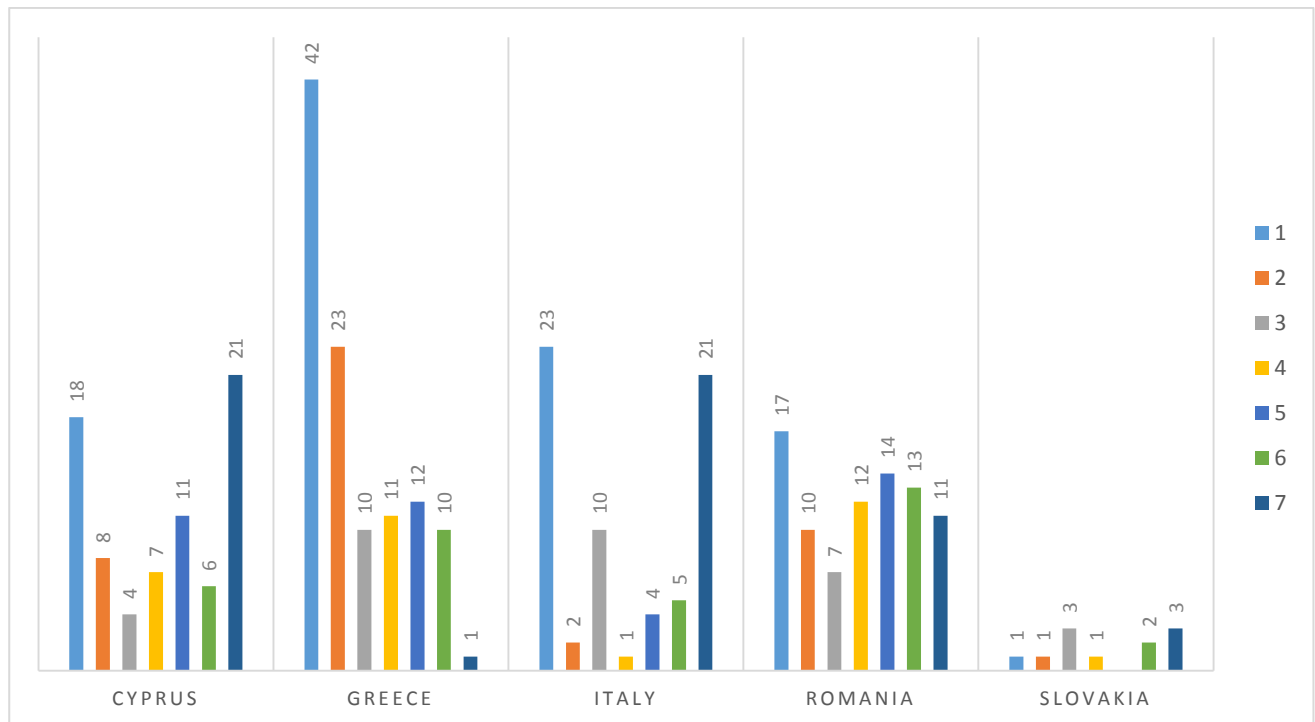| Count of 8. A 7-point Likert scale ranging from 1 to 7 is used to evaluate how often you play videogames and which types of videogames you prefer.								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**Grand Total**
Cyprus	7	15	9	12	10	5	17	75
Greece	14	23	20	17	13	13	9	109
Italy	19	3	4	7	8	9	16	66
Romania	6	8	14	12	15	17	12	84
Slovakia	1	4	1		2	2	1	11
Grand Total	**47**	**53**	**48**	**48**	**48**	**46**	**55**	**345**
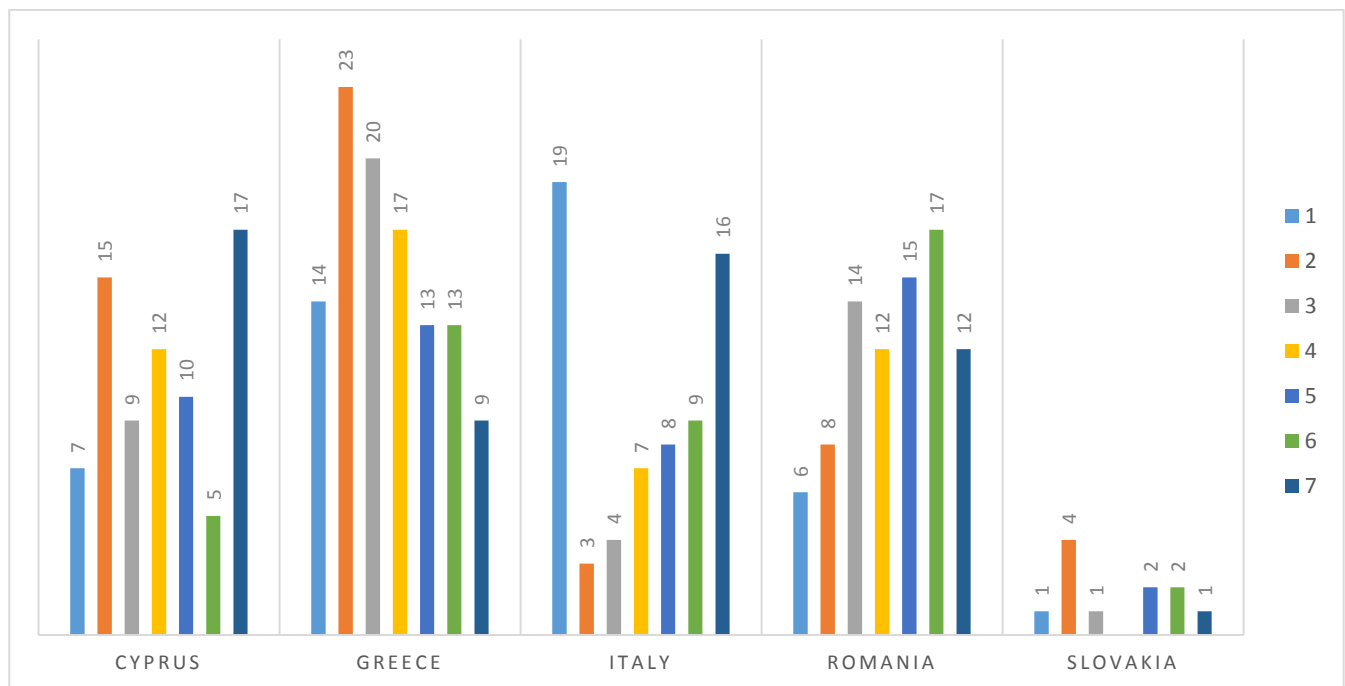
At the level of the five countries, it can be seen that most respondents (16%) play video games extremely, while 14% do not. Most 14% are playing pretty little, not a little, but not much or little more. Most respondents who play very often were in Cyprus (31%), then in Italy (30%) and Romania (22%). In Italy it is noted that respondents have opted more for the total lack of interest in games (29%) or for the total interest in video games (24%). In Greece, there is a tendency towards total or partial disinterest in video games, while in Romania there is a greater openness to the use of video games.

b. How much do you like First person shooters (FPS) games (e.g. Call of Duty (Black Ops) sagas, Borderlands, Halo or Bioshock)?

| Count of 8. A 7-point Likert scale ranging from 1 to 7 is used to evaluate how often you play videogames and which types of videogames you prefer.								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**Grand Total**
Cyprus	18	8	4	7	11	6	21	75
Greece	42	23	10	11	12	10	1	109
Italy	23	2	10	1	4	5	21	66
Romania	17	10	7	12	14	13	11	84
Slovakia	1	1	3	1		2	3	11
Grand Total	**101**	**44**	**34**	**32**	**41**	**36**	**57**	**345**

At project level, the total lack of interest (29%) in the shooter games is remarkable in comparison with the total interest in this type of games (only 17%). Greece is the country with the highest total lack of interest (42%), followed by Italy (23%) and Cyprus (18%). Italy and Cyprus are equal (37%) in terms of total interest in this type of games, Greece being the last in this regard.

c. How much do you like Adventure or thriller games (e.g. Uncharted sagas, Heavy Rain, Resident Evil or Assassin's Creed)?

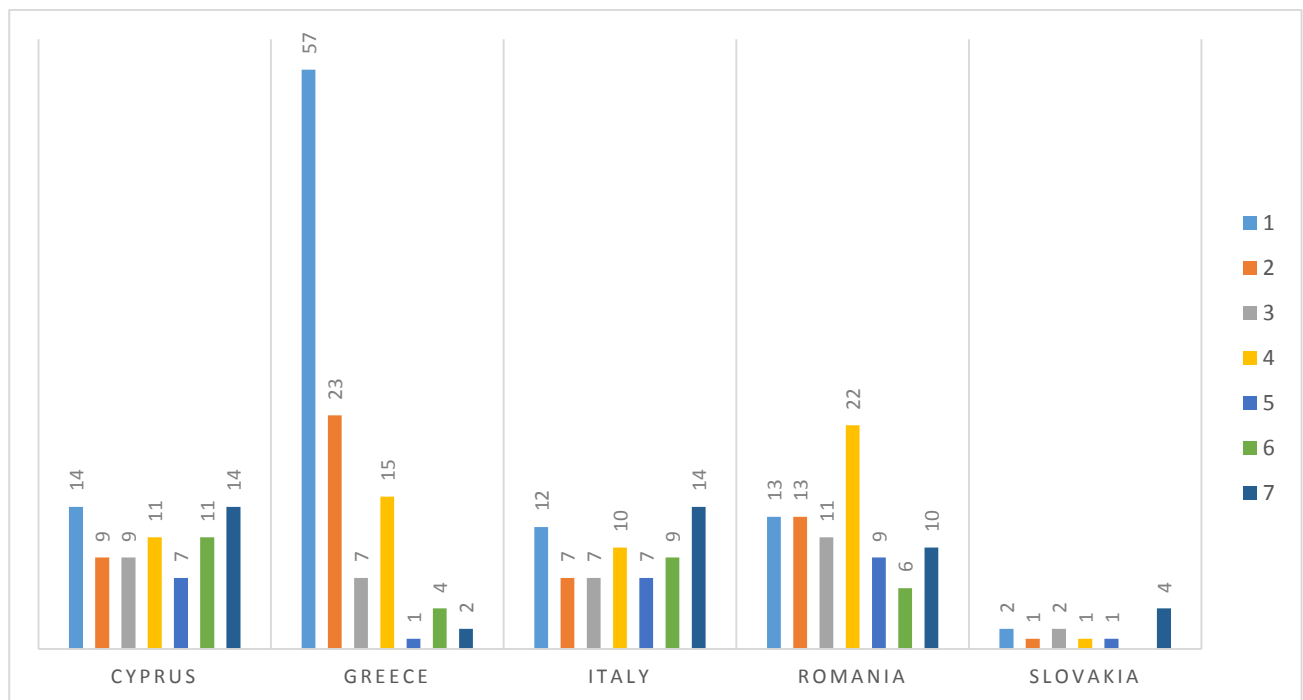| Count of 8. A 7-point Likert scale ranging from 1 to 7 is used to evaluate how often you play videogames and which types of videogames you prefer.	1	2	3	4	5	6	7	Grand Total
Cyprus	14	9	9	11	7	11	14	75
Greece	57	23	7	15	1	4	2	109
Italy	12	7	7	10	7	9	14	66
Romania	13	13	11	22	9	6	10	84
Slovakia	2	1	2	1	1		4	11
Grand Total	**98**	**53**	**36**	**59**	**25**	**30**	**44**	**345**
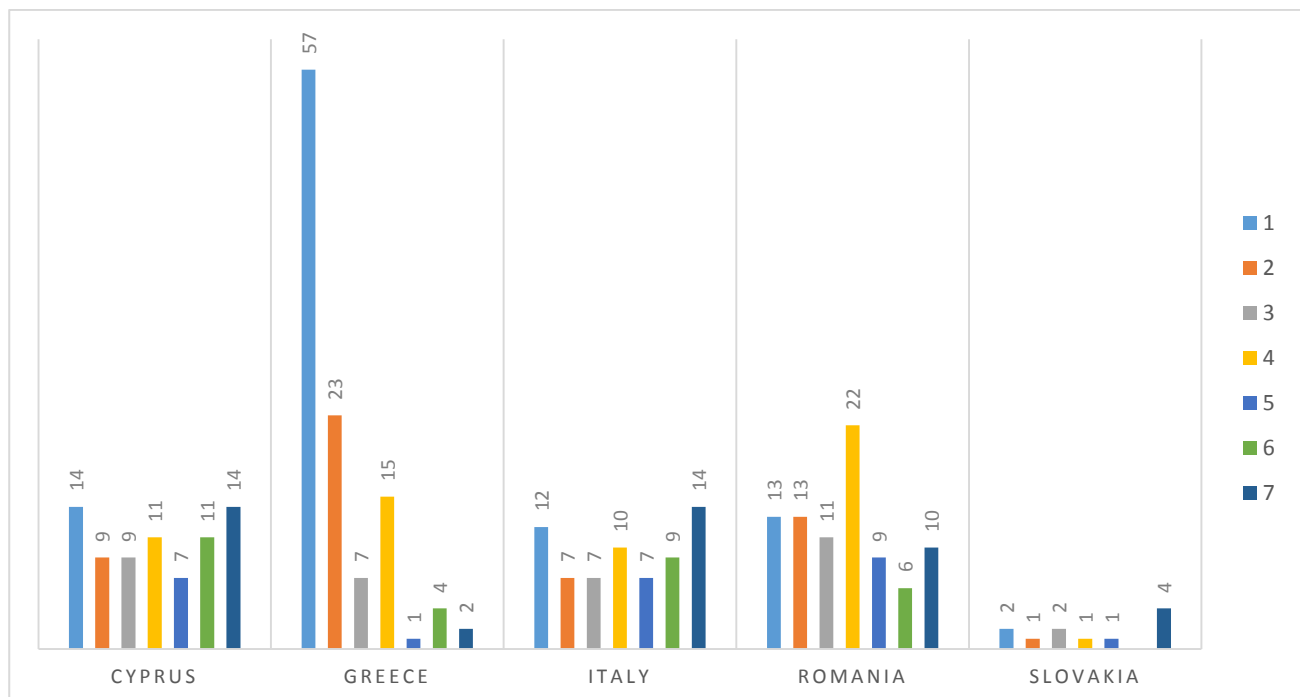
As can be seen from the previous table, preference for adventure games is low (28%) across all countries in the project, while 17% of respondents said they are not indifferent to these games, but they do not even prefer them way. Of all countries, Greece has the highest percentage of lack of interest in these games (58%), while Slovakia has the lowest rate (2%). The lowest affirmative response rates for this type of games are registered in Greece and Slovakia, Italy and Cyprus being on par with each other. At the level of Romania, we note that 26% of the respondents said their interest in this type of games is moderate, while 15% are totally indifferent and 12% like them.

d. How much do you like Singing, dancing or playing instruments games (e.g. Guitar Hero sagas, Sing Star or Just Dance)?

| Count of 8. A 7-point Likert scale ranging from 1 to 7 is used to evaluate how often you play videogames and which types of videogames you prefer.									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**N/A**	**Grand Total**
Cyprus	23	16	6	6	10	4	9	1	75
Greece	41	30	17	12	7	2			109
Italy	18	3	5	5	6	11	18		66
Romania	13	28	9	15	9	2	8		84
Slovakia	3		3	1		2	1	1	11
Grand Total	**98**	**77**	**40**	**39**	**32**	**21**	**36**	**2**	**345**

As can be seen from the previous table, the preference for this type of games is low (28%) for all countries in the project. The highest total disagreement regarding this type of games was registered in Greece (42%), followed by Cyprus (23%) and Italy (18%). Also, in Italy the highest interest in these games (18%) was noticed in comparison with the rest of the countries, Greece being an exception in this respect (none of the respondents expressed the total preference for these games).

e. How much do you like Fighting games (e.g. Tekken sagas, Mortal Kombat or Street Fighter)?

| Count of 8. A 7-point Likert scale ranging from 1 to 7 is used to evaluate how often you play videogames and which types of videogames you prefer.									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**N/A**	**Grand Total**
Cyprus	19	11	9	11	7	5	12	1	75
Greece	57	16	13	10	11	2			109
Italy	14	6	7	3	7	11	18		66
Romania	26	10	13	11	10	6	8		84
Slovakia	3	2	2	3			1		11
Grand Total	**119**	**45**	**44**	**38**	**35**	**24**	**39**	**1**	**345**
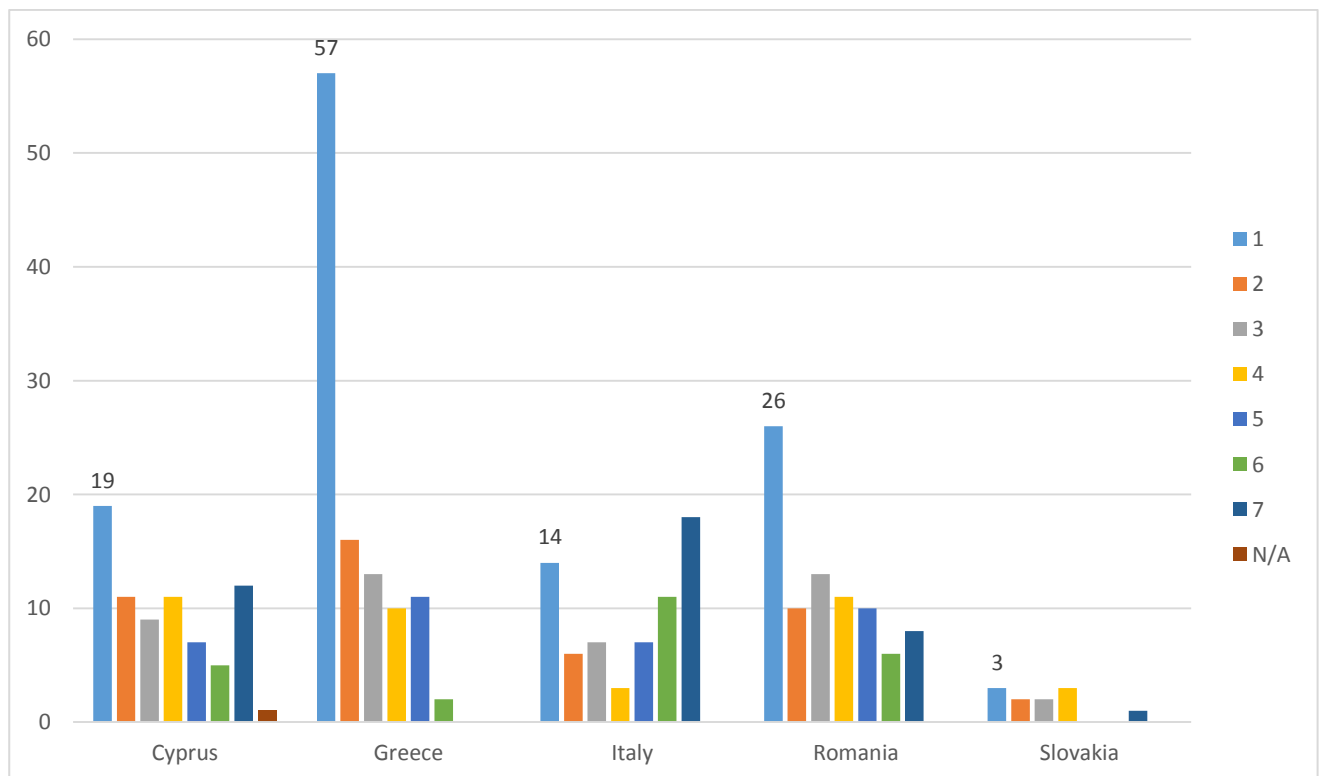
As can be seen from the previous table, the preference for this type of games is low (34%) across all countries in the project, while the overall interest rate is 11%. At the level of Greece, no respondent said they fully preferred these games, while 52% said they did not like it at all. At the level of Italy, we note that the total preference rate and the lack of total preference are very close (21% -27%). At the level of Romania, there is a lack of total preference (31%), while only 10% prefer it altogether. The second country with an increased rate of total preference for this type of games is Cyprus (16%).

f. How much do you like Intelligence and quiz/trivia games (e.g. Brain Training, Trivial or Brain Academy)?

| Count of 8. A 7-point Likert scale ranging from 1 to 7 is used to evaluate how often you play videogames and which types of videogames you prefer.	1	2	3	4	5	6	7	N/A	Grand Total
Cyprus	5	14	17	14	10	4	10	1	75
Greece	34	25	18	17	6	6	2	1	109
Italy	12	8	11	5	12	4	11	3	66
Romania	15	16	24	14	8	5	2		84
Slovakia	1	2		1	4	3			11
Grand Total	**67**	**65**	**70**	**51**	**40**	**22**	**25**	**5**	**345**
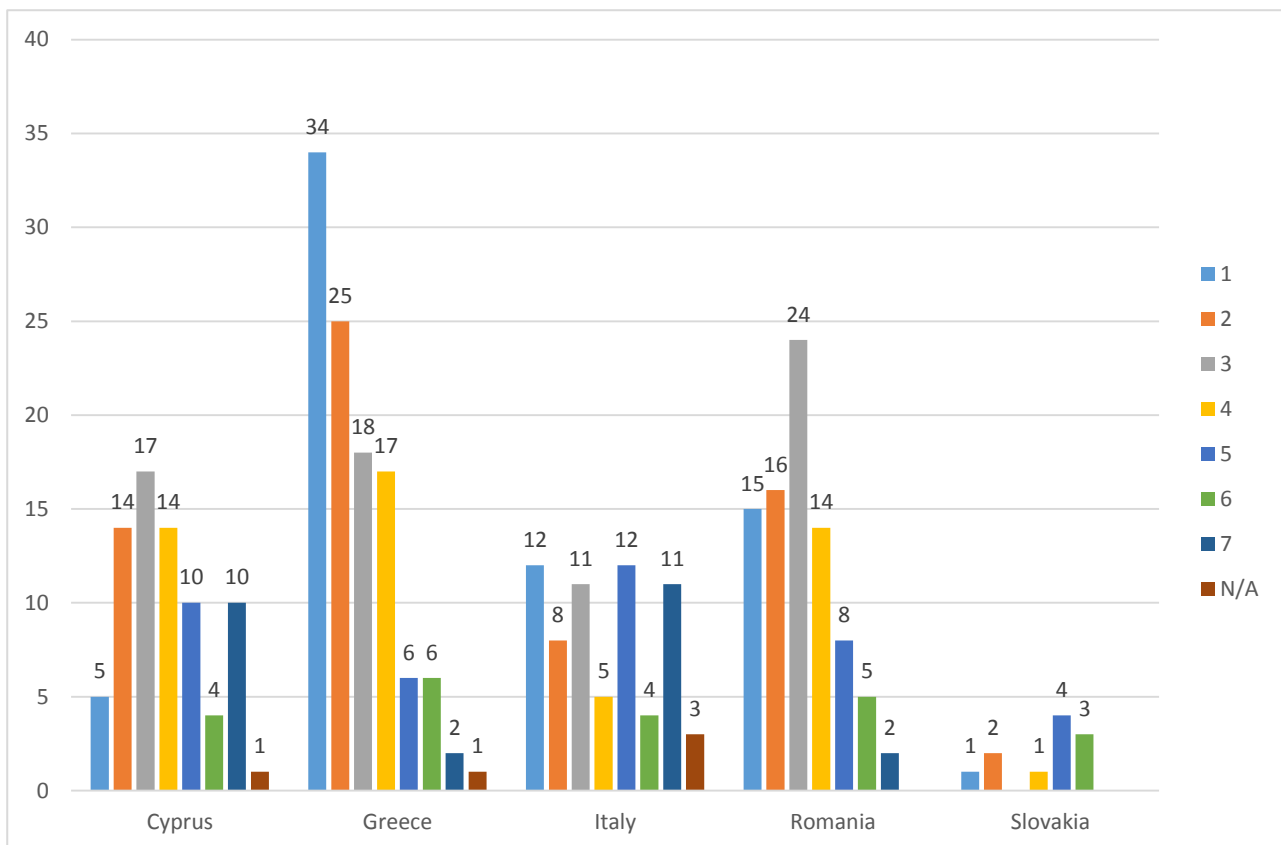
As can be seen from the previous table, the preference for this type of games is low for all countries in the project. Slovakia is noticed by the fact that no respondent has expressed its total preference for this type of game. We also note that there were respondents in Cyprus, Greece and Italy who did not answer this question. In terms of the overall preference rate for these games, Greece and Romania are equal, with 8%, while in Cyprus and Italy the rates are higher, 45% and 40%, respectively. The highest rate of total disinterest to these games was recorded by Greece (51%). Moderate interest is noted in Slovakia and Italy.

g. How much do you like Strategy games (e.g. Civilization sagas, Age of Empires or Starcraft)?

| Count of 8. A 7-point Likert scale ranging from 1 to 7 is used to evaluate how often you play videogames and which types of videogames you prefer.									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**N/A**	**Grand Total**
Cyprus	12	11	12	11	12	9	7	1	75
Greece	45	24	11	8	12	7	2		109
Italy	16	6	8	10	10	10	4	2	66
Romania	15	12	14	18	12	11	2		84
Slovakia	1		1	3		2	4		11
Grand Total	**89**	**53**	**46**	**50**	**46**	**39**	**19**	**3**	**345**
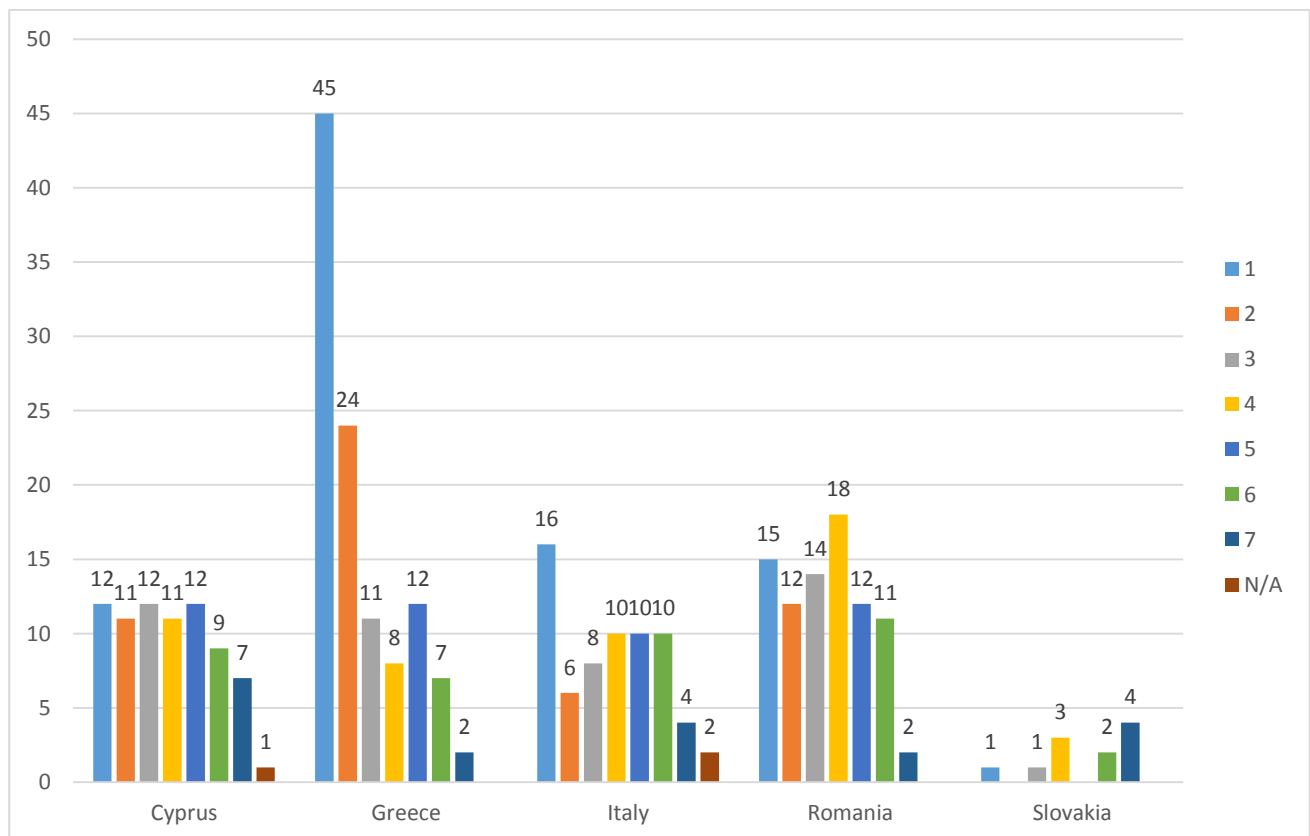
As can be seen from the previous table, the preference for this type of games is low for all countries in the project (26%), while only 6% of respondents expressed their total interest in this type of games. It is noted that Romania and Greece have the same overall interest rate (11%) as Slovakia and Italy (21%). The highest rate of total disinterest is noted in Greece, followed by Italy and Romania. Also in Cyprus and Italy there were respondents who did not answer this question.

h. How much do you like Internet collaborative games (e.g. FIFA, PES, NBA Live, Gran Turismo or Need for Speed)?

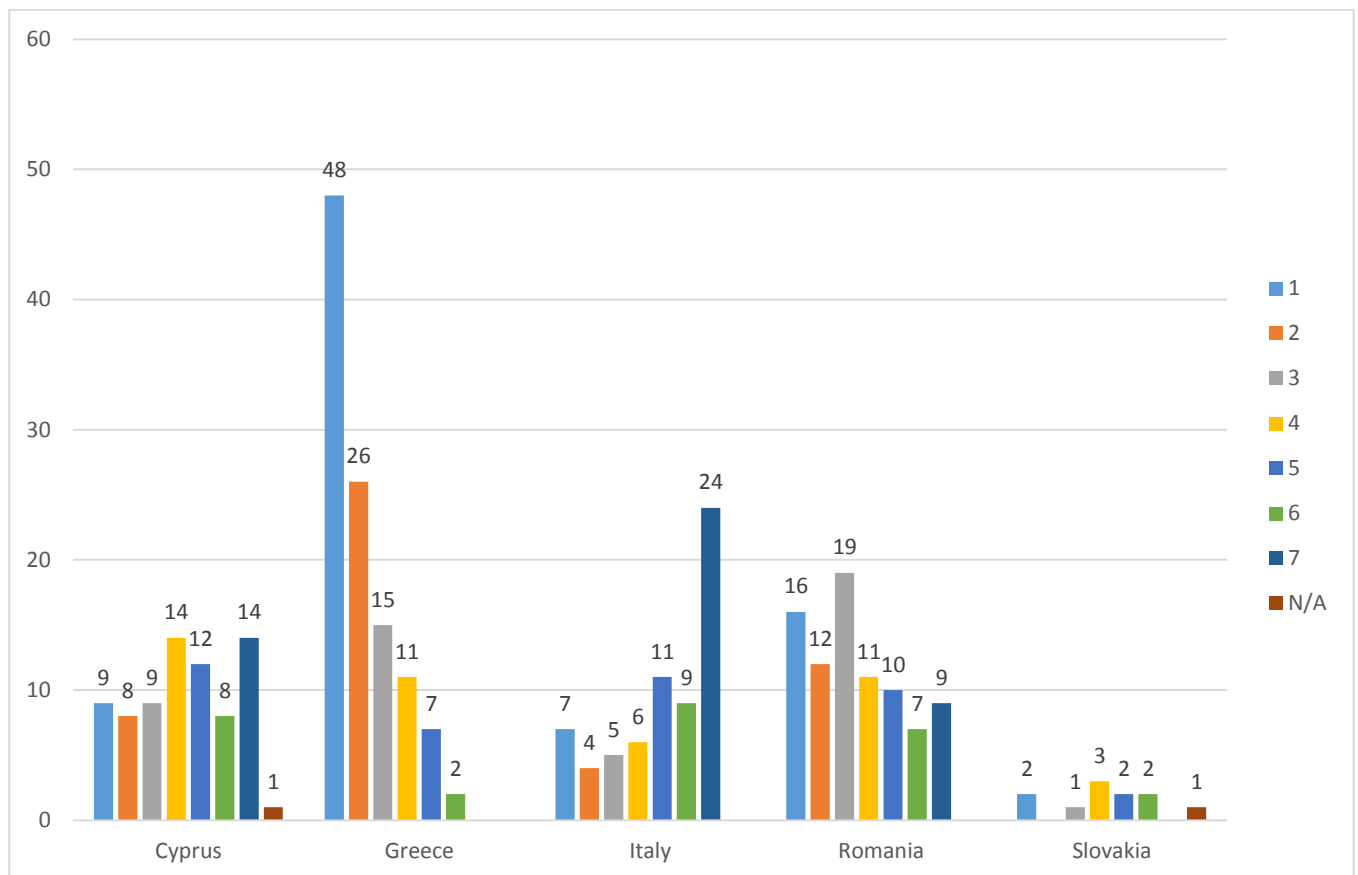| Count of 8. A 7-point Likert scale ranging from 1 to 7 is used to evaluate how often you play videogames and which types of videogames you prefer.	1	2	3	4	5	6	7	N/A	Grand Total
Cyprus	7	10	5	13	8	10	21	1	75
Greece	48	13	10	17	12	7	2		109
Italy	11	5	9	5	2	12	21	1	66
Romania	14	13	14	9	11	10	13		84
Slovakia	2		1	3	2	1	2		11
Grand Total	**82**	**41**	**39**	**47**	**35**	**40**	**59**	**2**	**345**
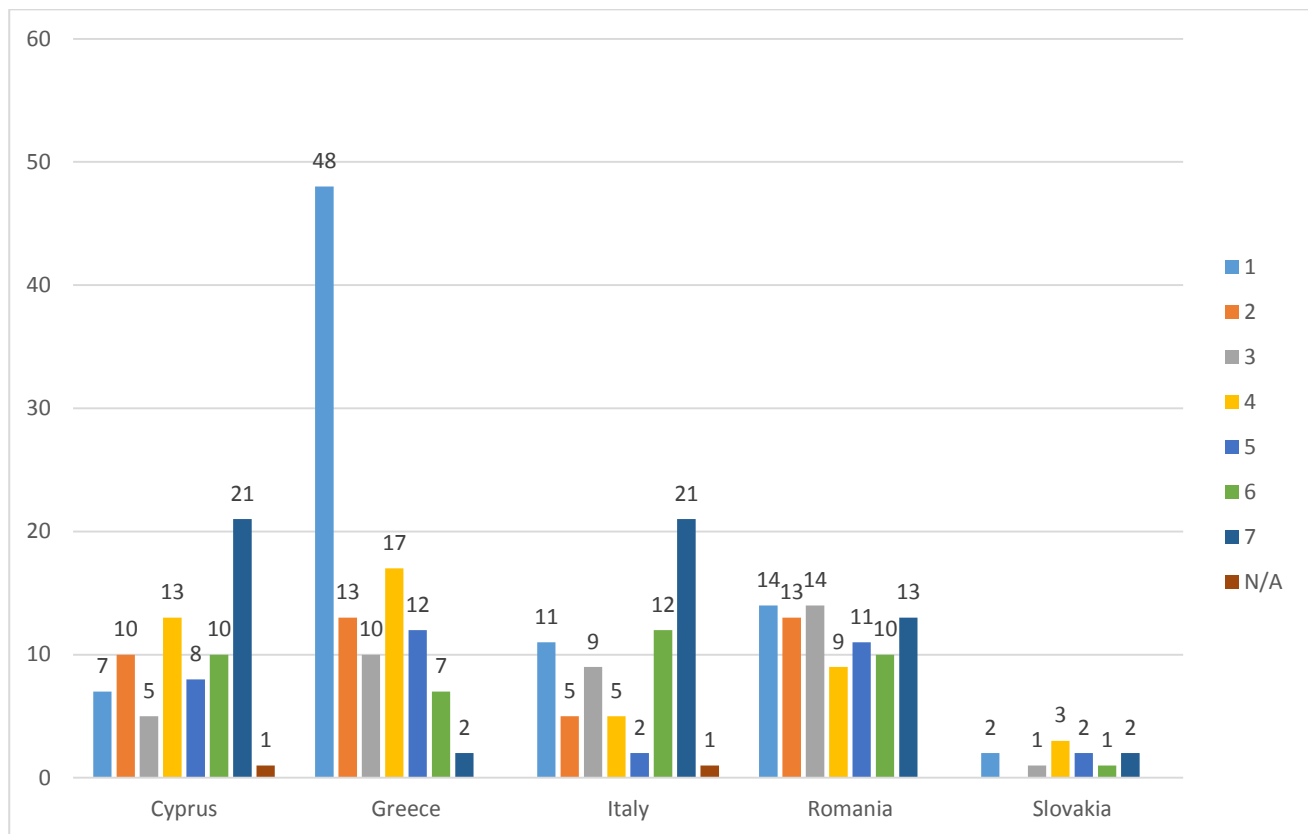
As can be seen from the previous table, the preference for this type of games is low for all countries in the project (24%), the countries with the highest disinterest rate being Greece (59%), followed by Romania (17%) and Italy (13%). In Greece, there is a big difference between total disinterest (44%) and total interest in this type of games (2%). At the level of Romania, the rate of total disinterest is very close to that of total interest (17% - 15%). Italy and Cyprus show the same overall interest rate, the highest in all countries, while in Greece

and Slovakia the lowest total interest rate is observed. In Italy and Cyprus there were respondents who did not answer this question.

i.   How much do you like Super Mario, Mario Kart or Wii Sports?

| Count of 8. A 7-point Likert scale ranging from 1 to 7 is used to evaluate how often you play videogames and which types of videogames you prefer.									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**N/A**	**Grand Total**
Cyprus	9	8	9	14	12	8	14	1	75
Greece	48	26	15	11	7	2			109
Italy	7	4	5	6	11	9	24		66
Romania	16	12	19	11	10	7	9		84
Slovakia	2		1	3	2	2		1	11
Grand Total	**82**	**50**	**49**	**45**	**42**	**28**	**47**	**2**	**345**

As can be seen from the table above, the highest total disinterest rate in these games is noted in Greece, followed by Romania and Cyprus. While in Italy and Cyprus the overall interest rate is increased, there was no respondent in Greece and Slovakia who would be totally interested in this kind of games. In all countries there was a total lack of interest in these games (24%).

j. How much do you like Sports, Racing or simulation (e.g. World of Warcraft or Farmville)?

| Count of 8. A 7-point Likert scale ranging from 1 to 7 is used to evaluate how often you play videogames and which types of videogames you prefer.	1	2	3	4	5	6	7	N/A	Grand Total
Cyprus	16	10	7	8	17	4	10	3	75
Greece	28	24	16	19	9	9	3	1	109
Italy	10	7	9	9	13	7	11		66
Romania	9	16	15	7	20	9	8		84
Slovakia	1		1	2		4	3		11
Grand Total	**64**	**57**	**48**	**45**	**59**	**33**	**35**	**4**	**345**
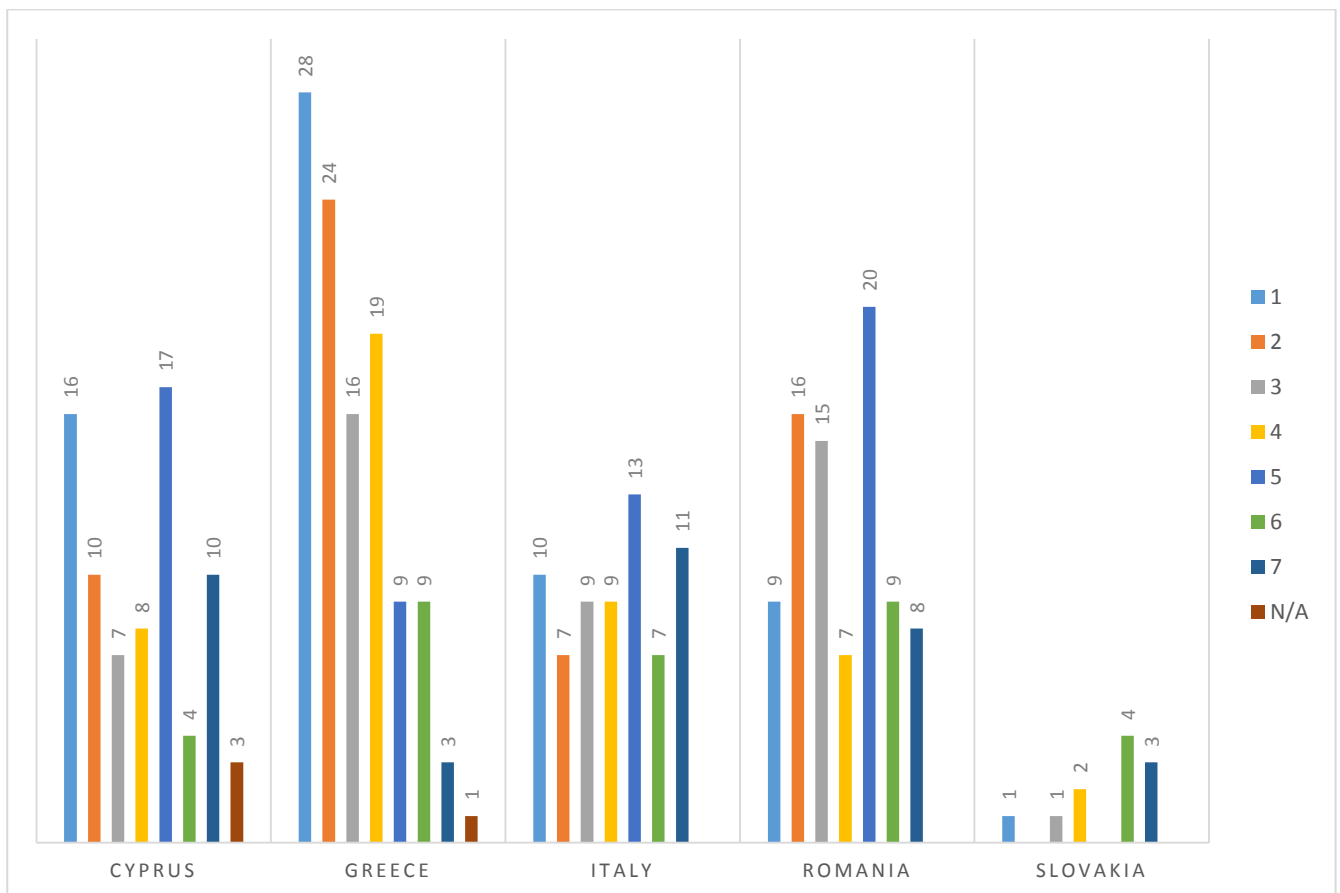
As can be seen from the previous table, the overall disinterest rate in all countries is increased (19%), with 1% of respondents choosing not to answer this question. While Greece and Cyprus record a high rate of total disinterest, Slovakia and Romania have a very low rate. In terms of total interest in this type of games, Italy and Cyprus are

remarkable, while Greece and Slovakia have the lowest rate. At Romania's level, there is a near rate between total disinterest and total interest.

9. Based on your answers in question 8, how would you rate your overall expertise with videogames?

| Count of 9. Based on your answers in question 8, how would you rate your overall expertise with videogames?	a. No experience	b. Novice	c. Intermediate	d. Advanced	e. Expert	N/A	Grand Total
Cyprus	2	17	21	19	15	1	75
Greece	7	33	32	32	4	1	109
Italy	11	18	21	11	4	1	66
Romania	6	11	26	27	14		84
Slovakia	1	2	2	4	2		11
Grand Total	**27**	**81**	**102**	**93**	**39**	**3**	**345**
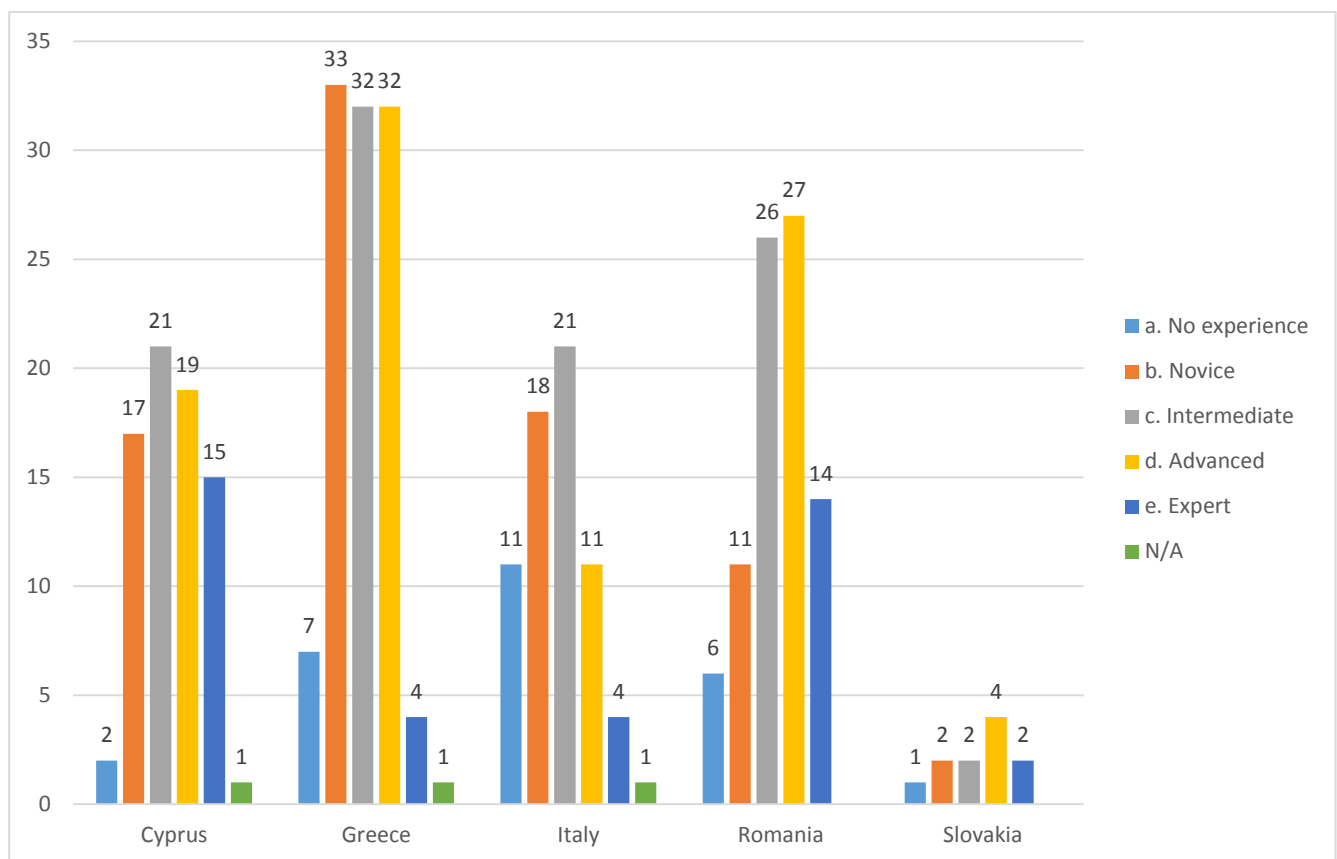
As can be seen from the previous table, 30% of respondents considered the experience with video games to be moderate, while 27% considered it to be an advanced one. At country level, Italy has the highest average in terms of lack of experience with video games, at the opposite end being Cyprus and Romania. Greece and Italy recorded the same rate in terms of expert experience.

10. How would you rate your expertise with virtual world 3D games/environments (e.g. SIMS University, Second Life 3D virtual world)?

| Count of 10. How would you rate your expertise with virtual world 3D games/environments (e.g. SIMS University, Second Life 3D virtual world)?	a. No experience	b. Novice	c. Intermediate	d. Advanced	e. Expert	N/A	Grand Total
Cyprus	16	17	21	16	4	1	75
Greece	20	31	40	17	1		109
Italy	22	26	8	7	2	1	66
Romania	17	21	20	18	8		84
Slovakia	1	4	3	2	1		11
Grand Total	**76**	**99**	**92**	**60**	**16**	**2**	**345**
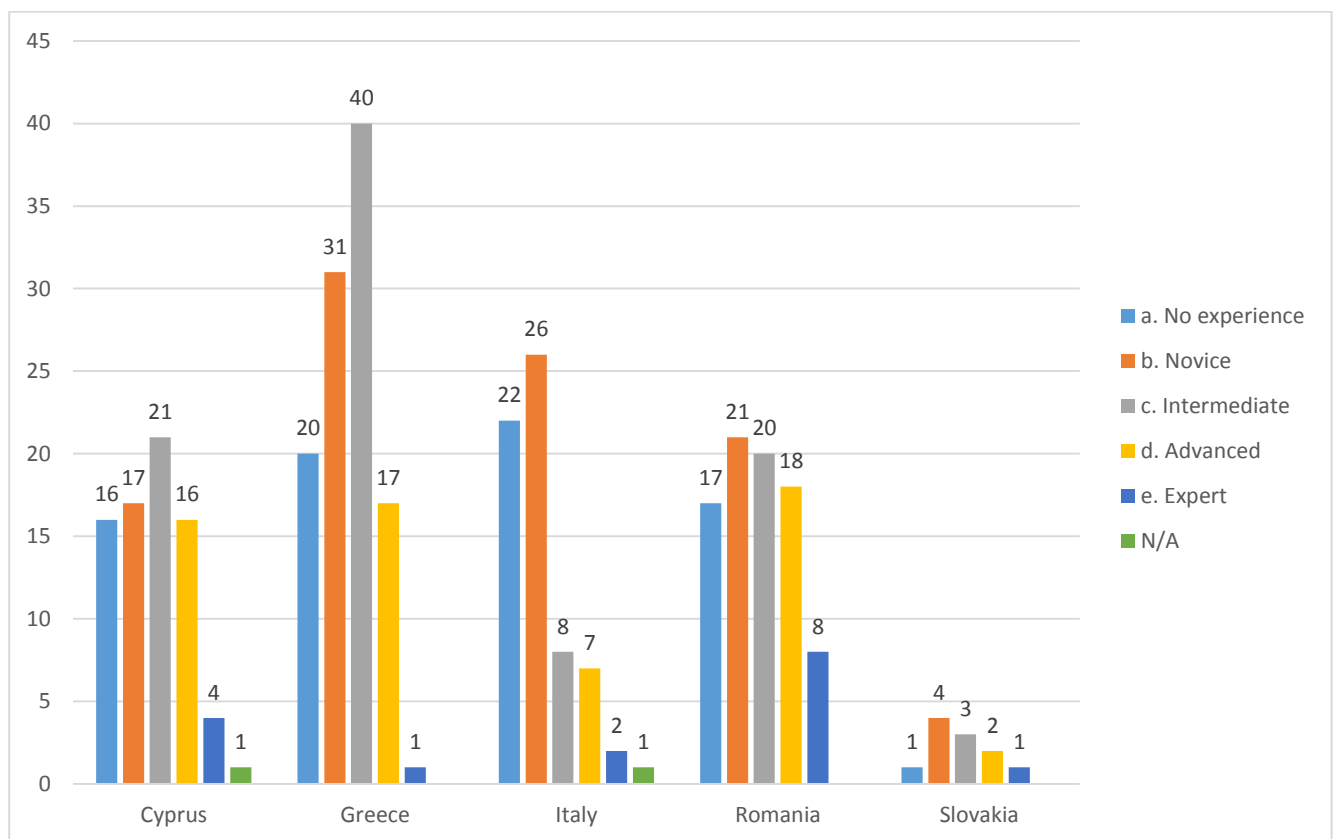
In terms of experience with 3D virtual worlds, most respondents (29%) said they were at the beginner level. The largest number of inexperienced respondents were registered in Italy, followed by Greece and Romania. At the opposite end, most respondents with the level of expert are in Romania, followed by Cyprus and Italy. At all countries, there is an increased level of intermediate level experience (27%).

1. A 5-point Likert scale ranging from 1 to 5 is used to evaluate the users' subjective impressions regarding the system and their degrees of satisfaction.

a. I think that I would like to use this Virtual 3D World frequently

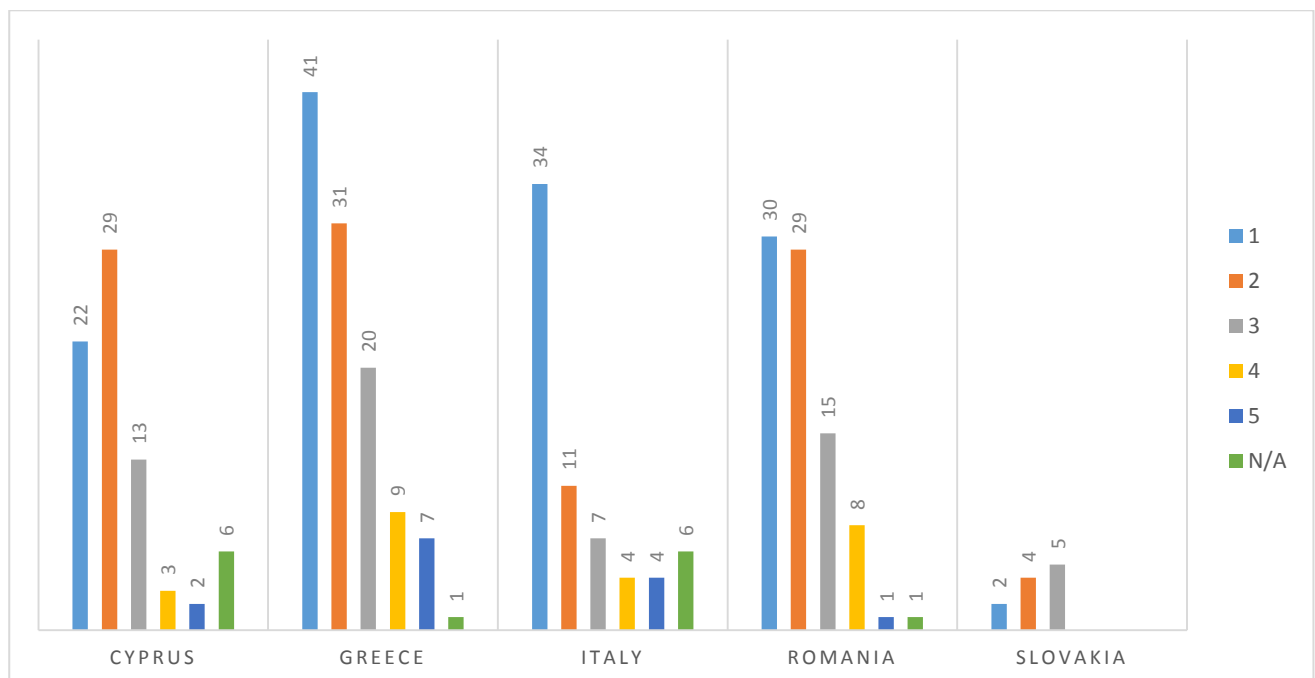| Count of 1. A 5-point Likert scale ranging from 1 to 5 is used to evaluate the users' subjective impressions regarding the system and their degrees of satisfaction.	1	2	3	4	5	N/A	Grand Total
Cyprus	13	12	25	17	4	4	75
Greece	7	18	31	32	20	1	109
Italy	4	3	13	16	29	1	66
Romania	4	5	27	35	13		84
Slovakia		1	6	3	1		11
Grand Total	**28**	**39**	**102**	**103**	**67**	**6**	**345**
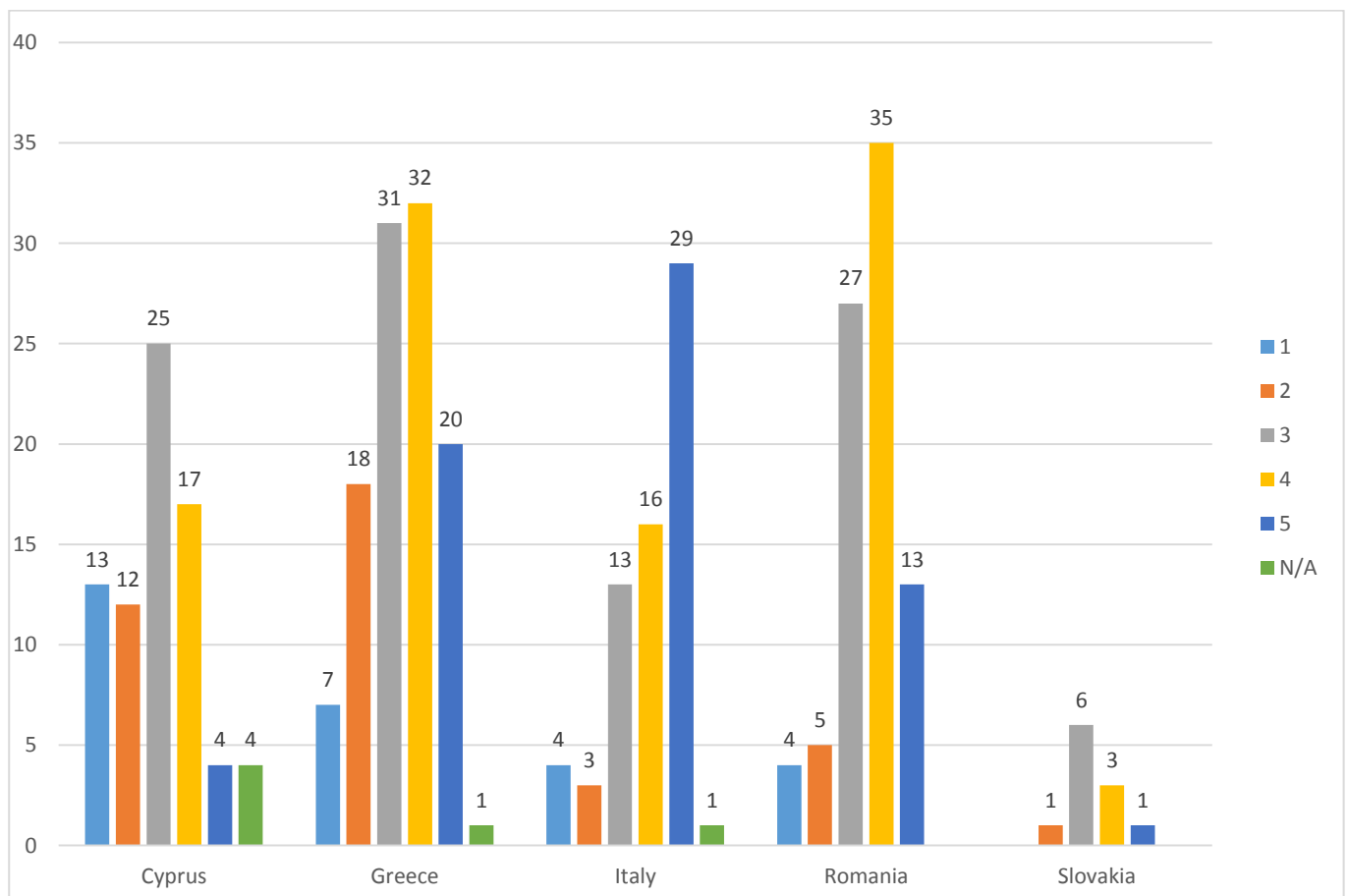
As can be seen from the previous table, 49% of respondents said they had a positive intention to use 3D virtual worlds more often than they do today, while 30% showed moderate interest and 19% less interest. The country with the highest interest rate is

Greece, followed by Romania and Italy. At the opposite pole is Cyprus and Slovakia. The lowest rate of interest in the use of these 3D virtual worlds is recorded in Romania and Italy.

b. I found the Virtual 3D World unnecessarily complex

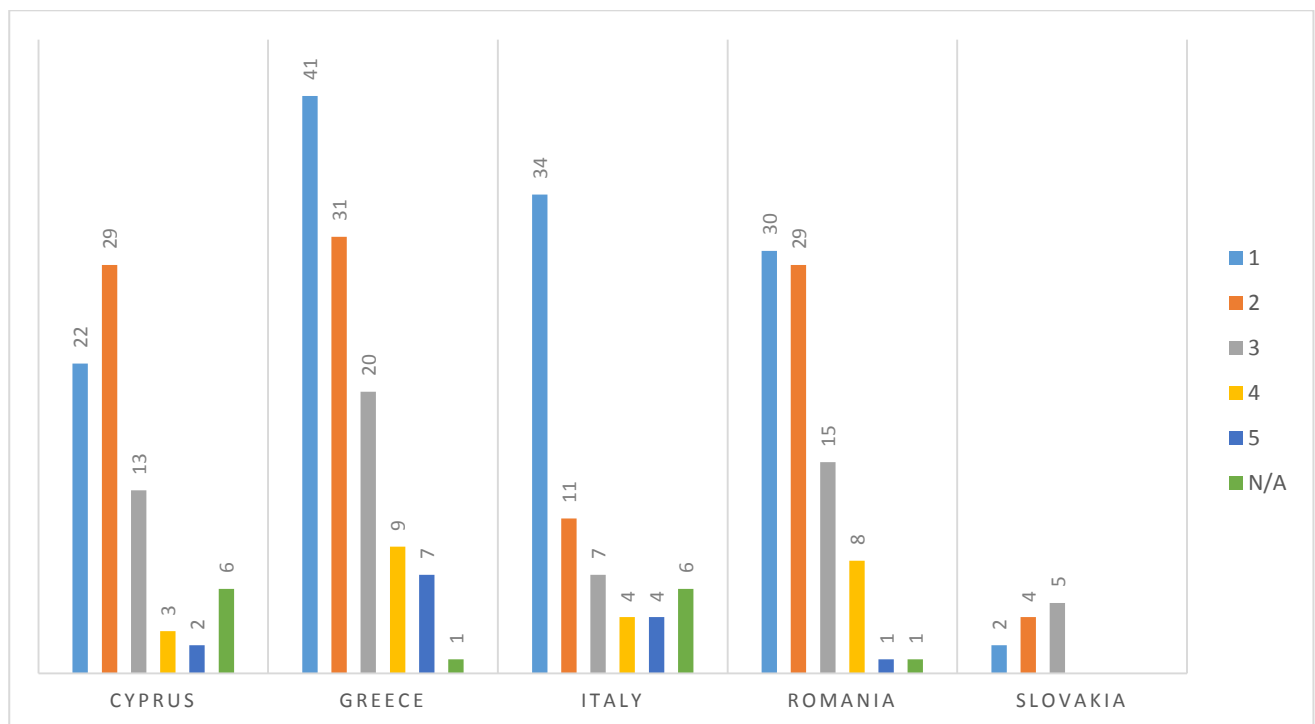| Count of 1. A 5-point Likert scale ranging from 1 to 5 is used to evaluate the users' subjective impressions regarding the system and their degrees of satisfaction.							
	1	**2**	**3**	**4**	**5**	**N/A**	**Grand Total**
Cyprus	22	29	13	3	2	6	75
Greece	41	31	20	9	7	1	109
Italy	34	11	7	4	4	6	66
Romania	30	29	15	8	1	1	84
Slovakia	2	4	5				11
Grand Total	**129**	**104**	**60**	**24**	**14**	**14**	**345**

As can be seen from the previous table, 68% of respondents considered that the virtual 3D world is not so unnecessarily complex, while only 8% considered it more complex than necessary. At the country level, Greece has the highest rate of disagreement over the redundancy of virtual world complexity, followed by Romania and Cyprus. At the opposite end, Cyprus and Italy, as well as Greece and Romania, are on the same footing as the opinion on the redundancy of high complexity.

c. I thought the Virtual 3D World was easy to use

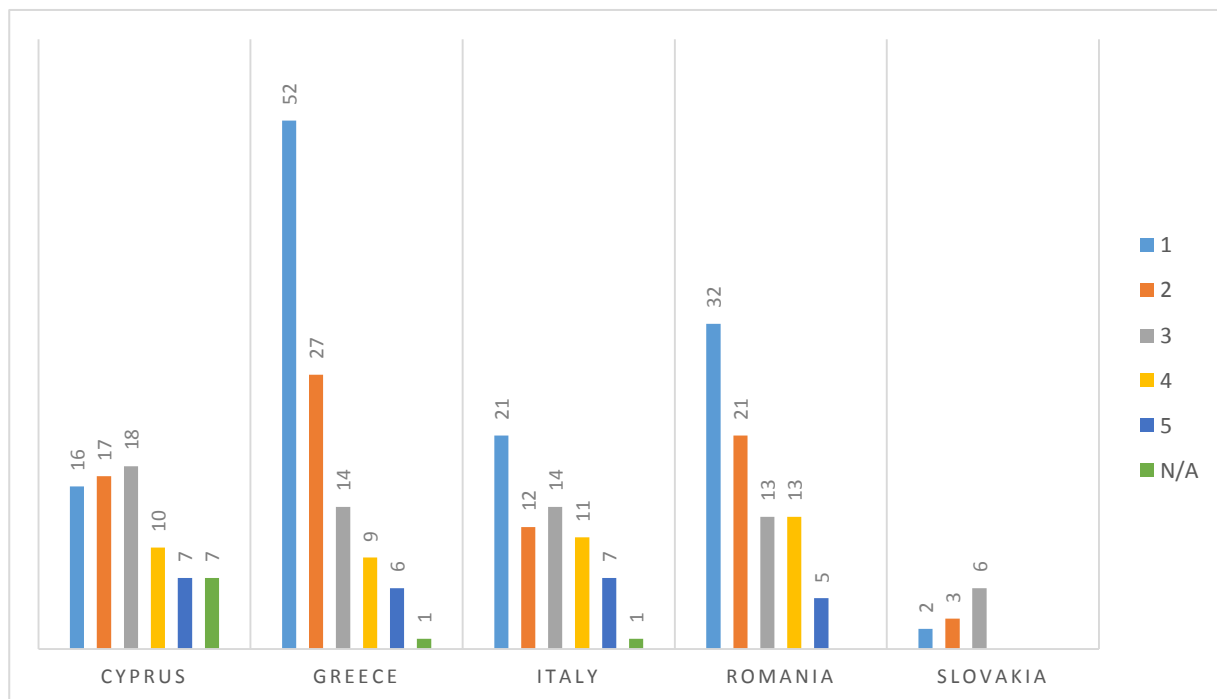| Count of 1. A 5-point Likert scale ranging from 1 to 5 is used to evaluate the users' subjective impressions regarding the system and their degrees of satisfaction.							
	1	**2**	**3**	**4**	**5**	**N/A**	**Grand Total**
Cyprus	1	13	21	22	8	10	75
Greece	11	14	27	20	36	1	109
Italy	3	8	14	22	17	2	66
Romania	2	4	37	22	19		84
Slovakia		3	3	3	1	1	11
Grand Total	**17**	**42**	**102**	**89**	**81**	**14**	**345**

As can be seen from the previous table, 49% of respondents said 3D virtual worlds were easy to use, while 30% considered it was neither difficult nor easy to use, and only 17% disagreed. Only 4% of respondents chose not to answer this question. Greece is the first to agree on the accessibility of 3D virtual worlds, followed by Romania and Italy. The highest disagreement is recorded in Greece, followed by Cyprus and Italy.

d. I think that I would need the support of a technical person to be able to use this Virtual 3D World

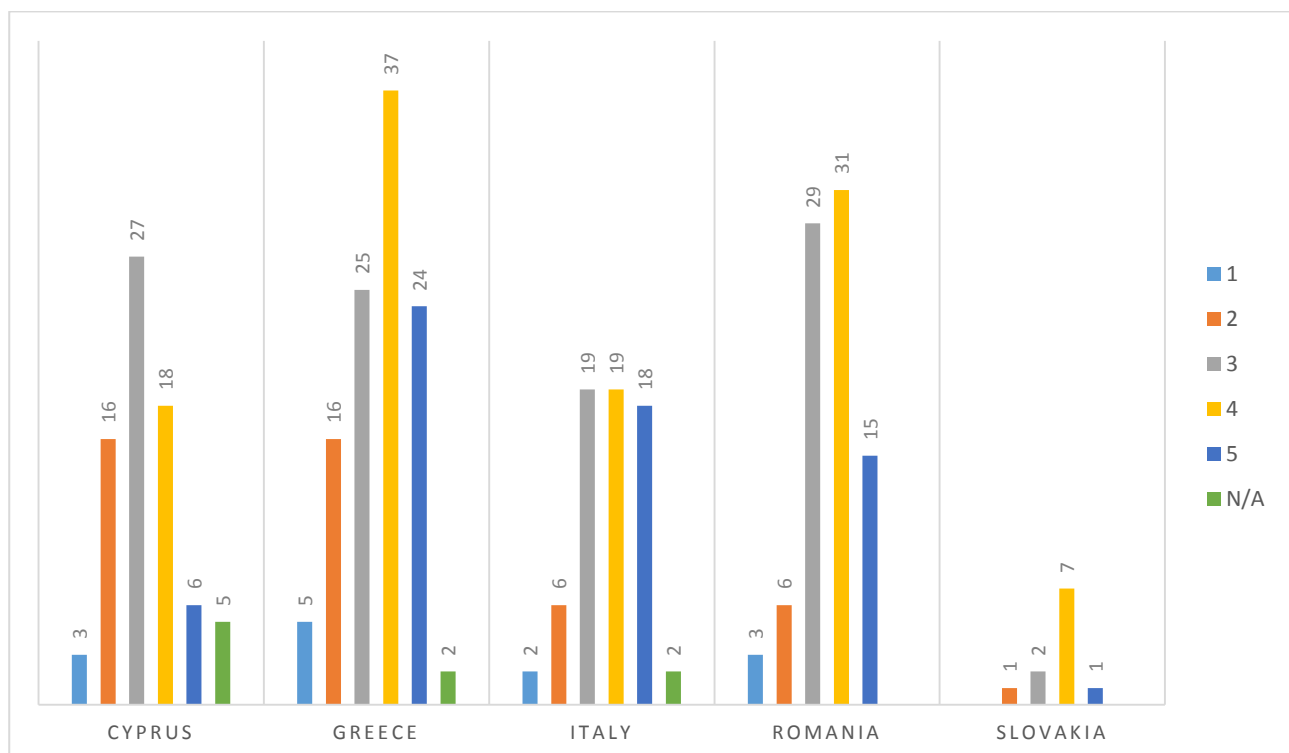| Count of 1. A 5-point Likert scale ranging from 1 to 5 is used to evaluate the users' subjective impressions regarding the system and their degrees of satisfaction. [a. I think that I would like to use this Virtual 3D World frequently]							
	1	**2**	**3**	**4**	**5**	**N/A**	**Grand Total**
Cyprus	16	17	18	10	7	7	75
Greece	52	27	14	9	6	1	109
Italy	21	12	14	11	7	1	66
Romania	32	21	13	13	5		84
Slovakia	2	3	6				11
Grand Total	**123**	**80**	**65**	**43**	**25**	**9**	**345**

As can be seen from the previous table, 59% of respondents felt they did not need technical support to use 3D virtual worlds, while 19% said they nor not feel the need for technical support, neither reject it, while 68% said they needed technical support. The countries with the highest need for technical support are Greece and Romania, followed by Italy and Cyprus.

e. I found the various functions in this Virtual 3D World were well integrated

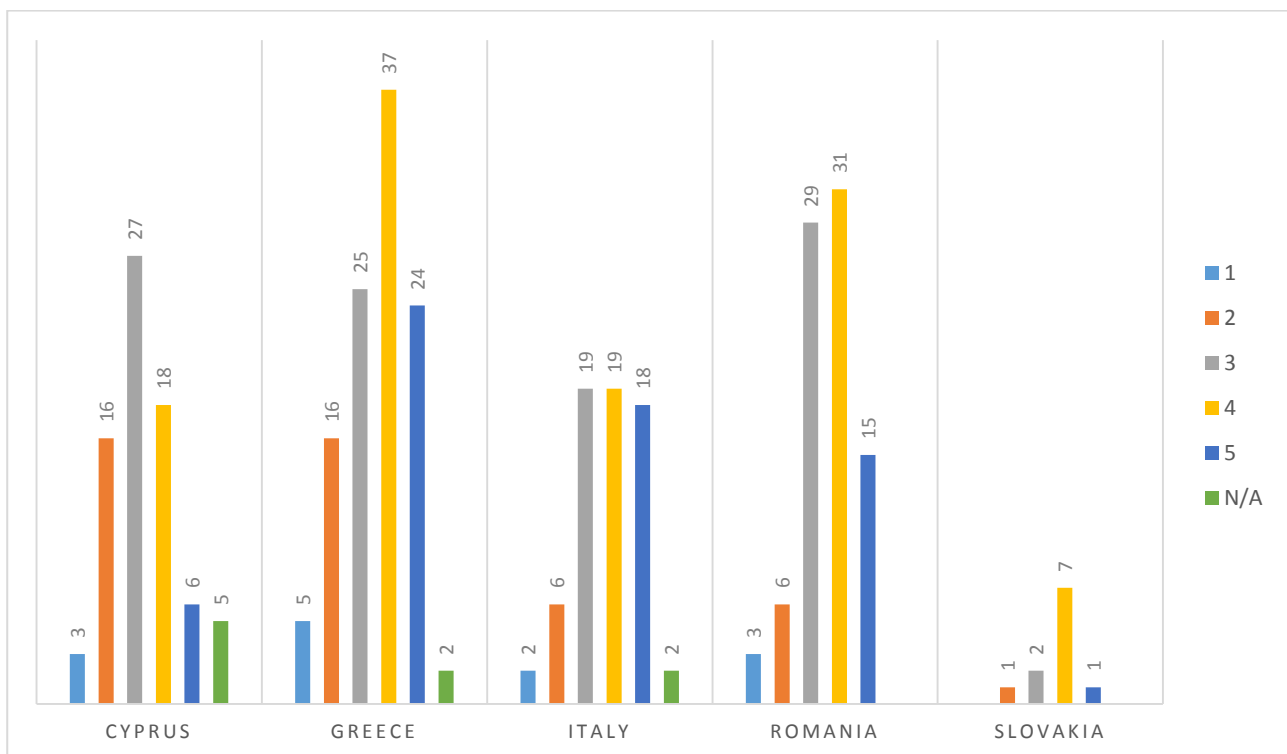| Count of 1. A 5-point Likert scale ranging from 1 to 5 is used to evaluate the users' subjective impressions regarding the system and their degrees of satisfaction. [a. I think that I would like to use this Virtual 3D World frequently]	1	2	3	4	5	N/A	Grand Total
Cyprus	3	16	27	18	6	5	75
Greece	5	16	25	37	24	2	109
Italy	2	6	19	19	18	2	66
Romania	3	6	29	31	15		84
Slovakia		1	2	7	1		11
Grand Total	**13**	**45**	**102**	**112**	**64**	**9**	**345**

51% of respondents said that different functionalities of the 3D virtual worlds were very well integrated, while 30% did not have a clear opinion in this respect and only 17% felt that they were not sufficiently integrated. The highest positive response rates are found in Greece and Romania, then in Italy and Cyprus. Only 2% of respondents declined to answer this question.

f. I thought there was too much inconsistency in this Virtual 3D World

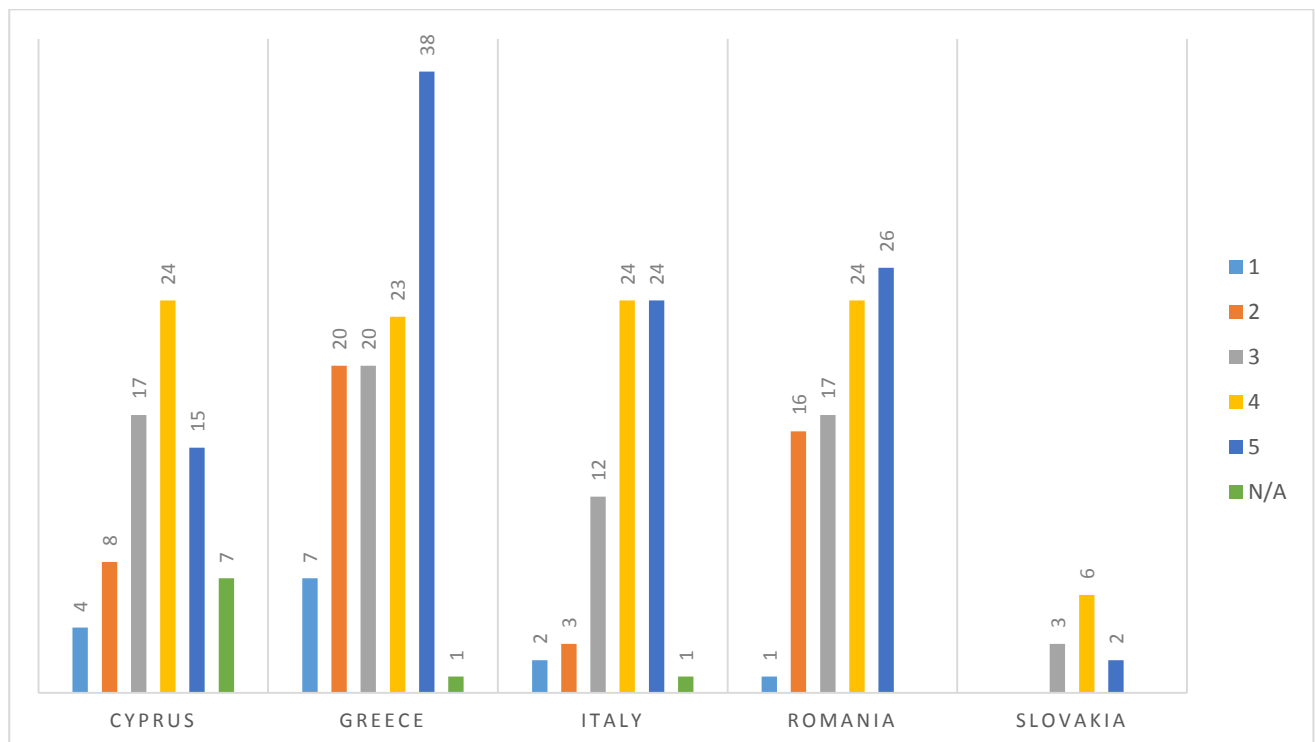| Count of 1. A 5-point Likert scale ranging from 1 to 5 is used to evaluate the users' subjective impressions regarding the system and their degrees of satisfaction. [a. I think that I would like to use this Virtual 3D World frequently]							
	1	**2**	**3**	**4**	**5**	**N/A**	**Grand Total**
Cyprus	22	25	15	5	3	5	75
Greece	55	29	11	8	5	1	109
Italy	23	15	11	10	2	5	66
Romania	21	17	32	11	3		84
Slovakia	2	6	3				11
Grand Total	**123**	**92**	**72**	**34**	**13**	**11**	**345**

As can be seen in the previous table, 62% of respondents responded negatively to the inconsistency of 3D virtual worlds, 21% said they did not see this, and only 14% thought they were inconsistent. The highest rates for disapproval of inconsistency are found in Greece, followed by Cyprus and then Italy and Romania.

g. I would imagine that most people would learn to use this Virtual 3D World very quickly

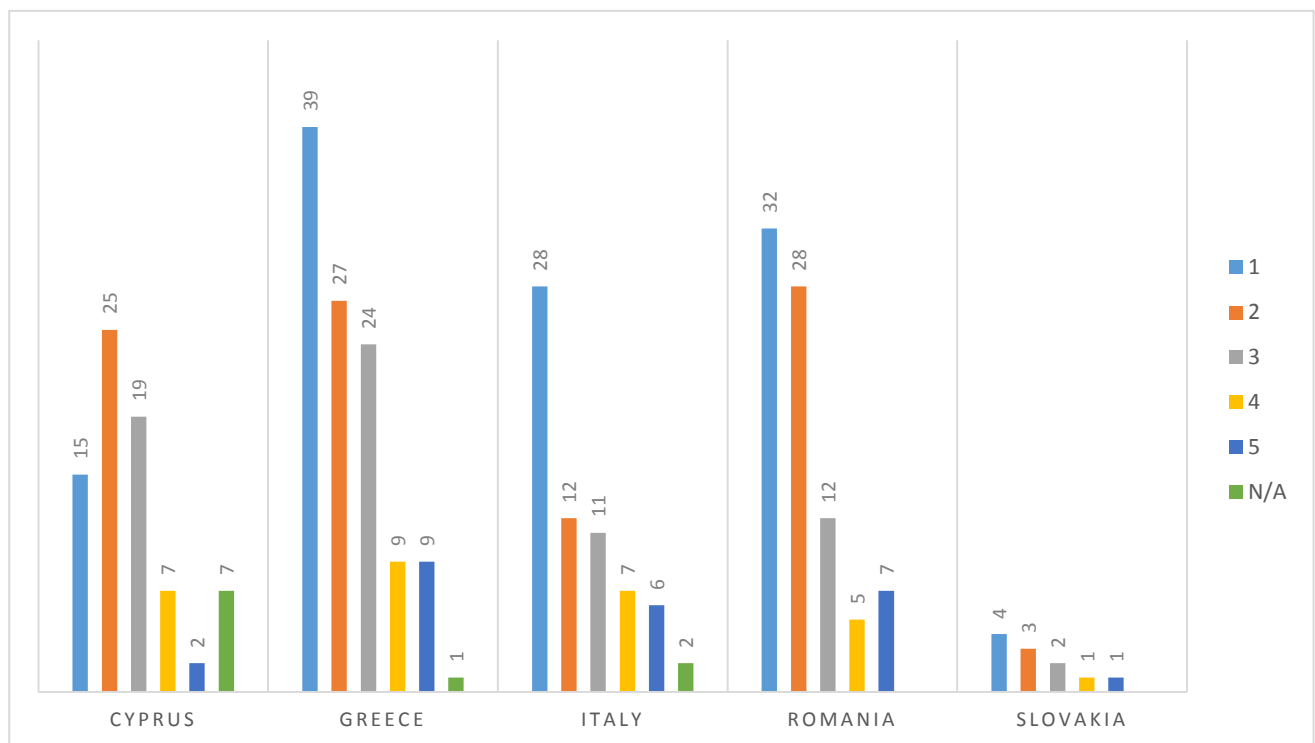| Count of 1. A 5-point Likert scale ranging from 1 to 5 is used to evaluate the users' subjective impressions regarding the system and their degrees of satisfaction.							
	1	**2**	**3**	**4**	**5**	**N/A**	**Grand Total**
Cyprus	4	8	17	24	15	7	75
Greece	7	20	20	23	38	1	109
Italy	2	3	12	24	24	1	66
Romania	1	16	17	24	26		84
Slovakia			3	6	2		11
Grand Total	**14**	**47**	**69**	**101**	**105**	**9**	**345**

As can be seen from the previous table, 60% of respondents believe that 3D virtual worlds are useful and most can easily learn from them, while 20% consider the learning process to be balanced, while only 18% consider you can not easily learn using the 3D virtual worlds. Greece has the highest rate of reliance on ease of use of virtual worlds, followed by Romania and Italy, with Cyprus and Slovakia opposite.

h. I found the Virtual 3D World very cumbersome to use

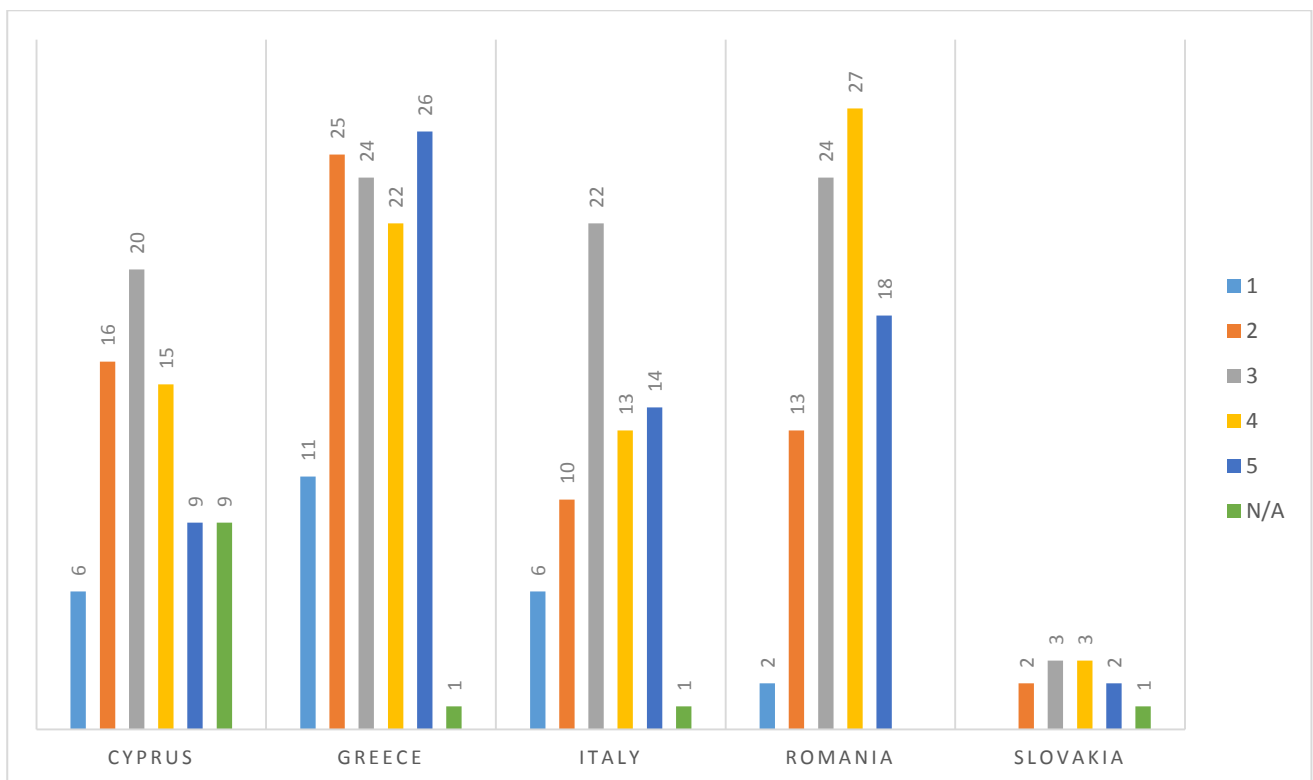| Count of 1. A 5-point Likert scale ranging from 1 to 5 is used to evaluate the users' subjective impressions regarding the system and their degrees of satisfaction.							
	1	**2**	**3**	**4**	**5**	**N/A**	**Grand Total**
Cyprus	15	25	19	7	2	7	75
Greece	39	27	24	9	9	1	109
Italy	28	12	11	7	6	2	66
Romania	32	28	12	5	7		84
Slovakia	4	3	2	1	1		11
Grand Total	**118**	**95**	**68**	**29**	**25**	**10**	**345**

As can be seen from the previous table, 62% of respondents do not find it difficult to use 3D virtual worlds, while 20% think it is neither difficult nor easy, and 16% think it is difficult to use. Greece followed by Romania and Italy show an openness to the use of 3D virtual worlds, with an increased rate of disapproval of the high degree of difficulty in use.

i. I felt very confident using the Virtual 3D World

| Count of 1. A 5-point Likert scale ranging from 1 to 5 is used to evaluate the users' subjective impressions regarding the system and their degrees of satisfaction.							
	1	**2**	**3**	**4**	**5**	**N/A**	**Grand Total**
Cyprus	6	16	20	15	9	9	75
Greece	11	25	24	22	26	1	109
Italy	6	10	22	13	14	1	66
Romania	2	13	24	27	18		84
Slovakia		2	3	3	2	1	11
Grand Total	**25**	**66**	**93**	**80**	**69**	**12**	**345**

As can be seen from the previous table, 43% of respondents consider themselves confident when using 3D virtual worlds and only 26% did not feel confident. Greece and Romania record a positive rate of confidence, while in Italy and Cyprus the rate is moderate and in Slovakia very low.

j. I needed to learn many subjects before I could go on with the exercises proposed in the 3D virtual world

| Count of 1. A 5-point Likert scale ranging from 1 to 5 is used to evaluate the users' subjective impressions regarding the system and their degrees of satisfaction.							
	1	**2**	**3**	**4**	**5**	**N/A**	**Grand Total**
Cyprus	2		2	4		67	75
Greece	38	36	15	14	5	1	109
Italy	15	14	15	14	6	2	66
Romania	21	29	16	13	5		84
Slovakia	2	4	3	1		1	11
Grand Total	**78**	**83**	**51**	**46**	**16**	**71**	**345**
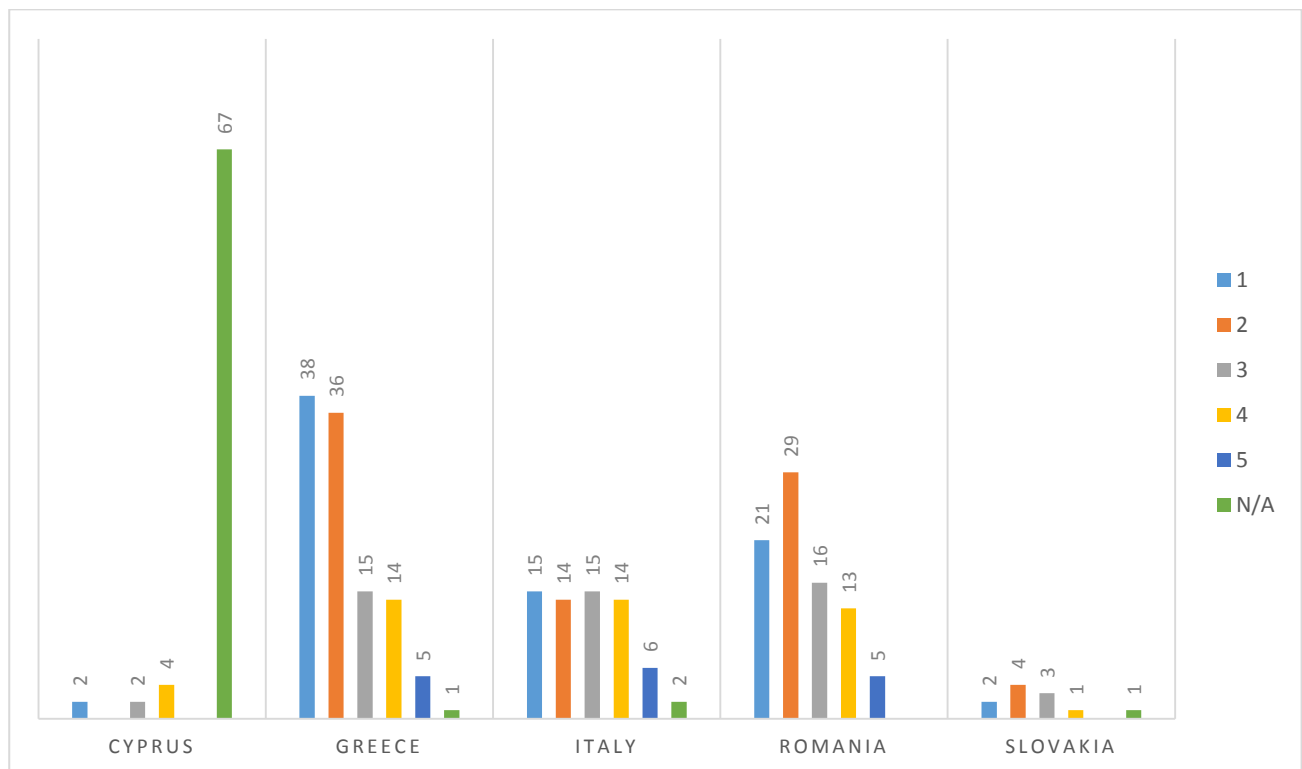
As can be seen from the previous table, 47% of respondents considered enough information to be able to go through the exercises in the virtual worlds, while 18% felt that they needed to learn a few things to go through the tests. 21% of respondents declined to answer this question, with the largest share being recorded in Cyprus. Participants in Greece and Romania considered that the necessary information to pass the tests was provided, with a low rate being recorded in Cyprus and Slovakia.

2. Please tick the box that best represents how you feel about the 3D virtual environment as a learning tool to study Physics

a. Comfort using this learning tool

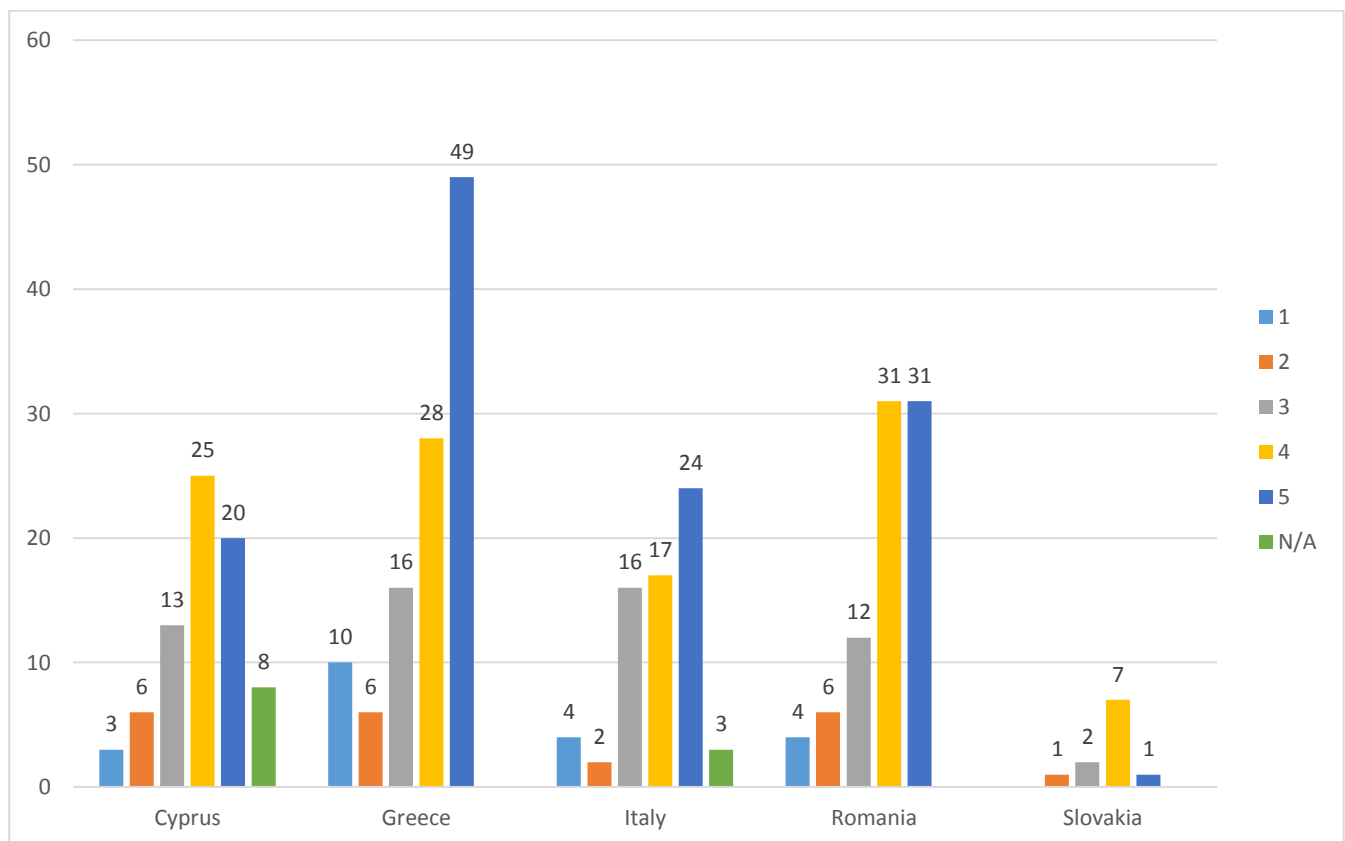| Count of 2. Please tick the box that best represents how you feel about the 3D virtual environment as a learning tool to study Physics [a. Comfort using this learning tool]							
	1	**2**	**3**	**4**	**5**	**N/A**	**Grand Total**
Cyprus	3	11	17	19	19	6	75
Greece	11	6	24	30	38		109
Italy	4	6	19	16	19	2	66
Romania	1	5	12	38	28		84
Slovakia			1	5	5		11
Grand Total	**19**	**28**	**73**	**108**	**109**	**8**	**345**
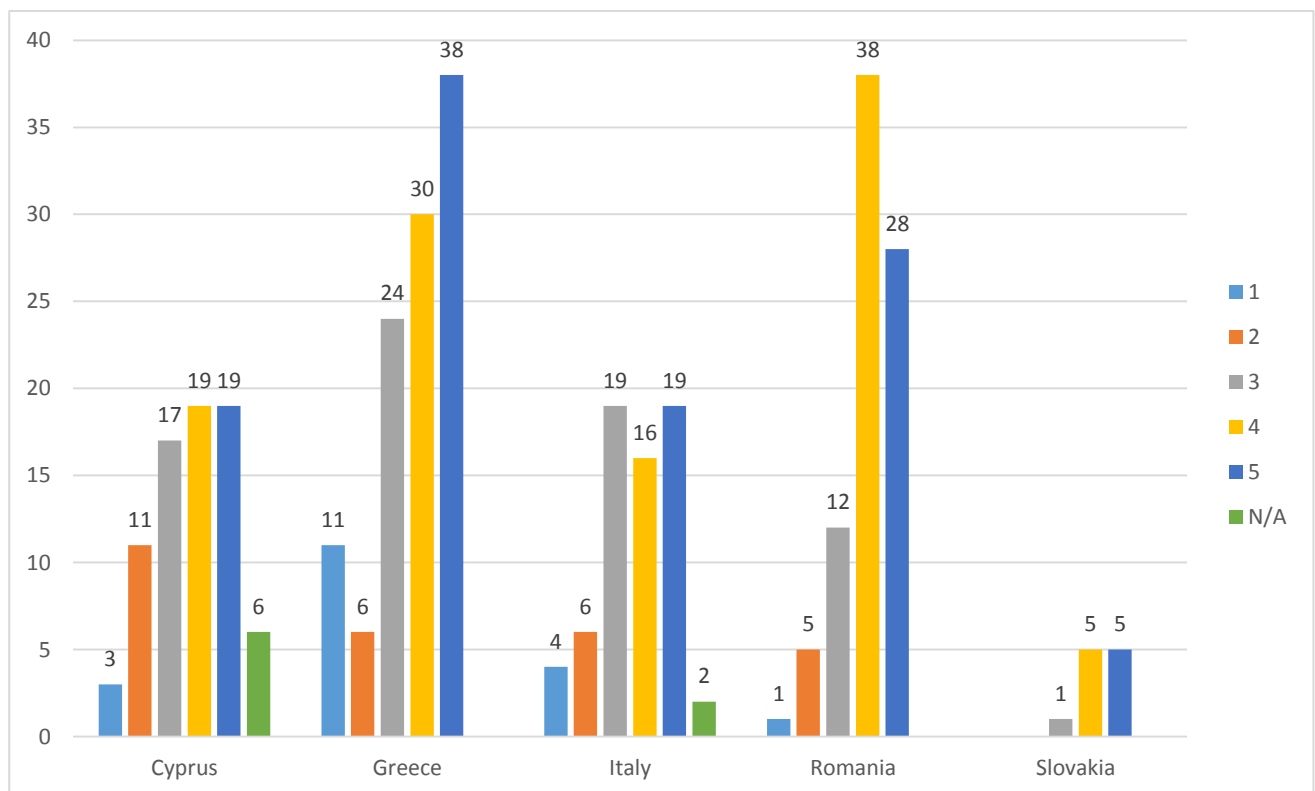
Regarding the convenience of using virtual 3D worlds as a learning method, 63% of respondents said they felt comfortable, while 14% said they did not feel comfortable. The countries with the highest comfort rate are Greece and Romania, followed by Cyprus and Italy on equal terms. The highest rate of discomfort was recorded in Greece, the smallest being in Romania.

b. Impact on learning performance

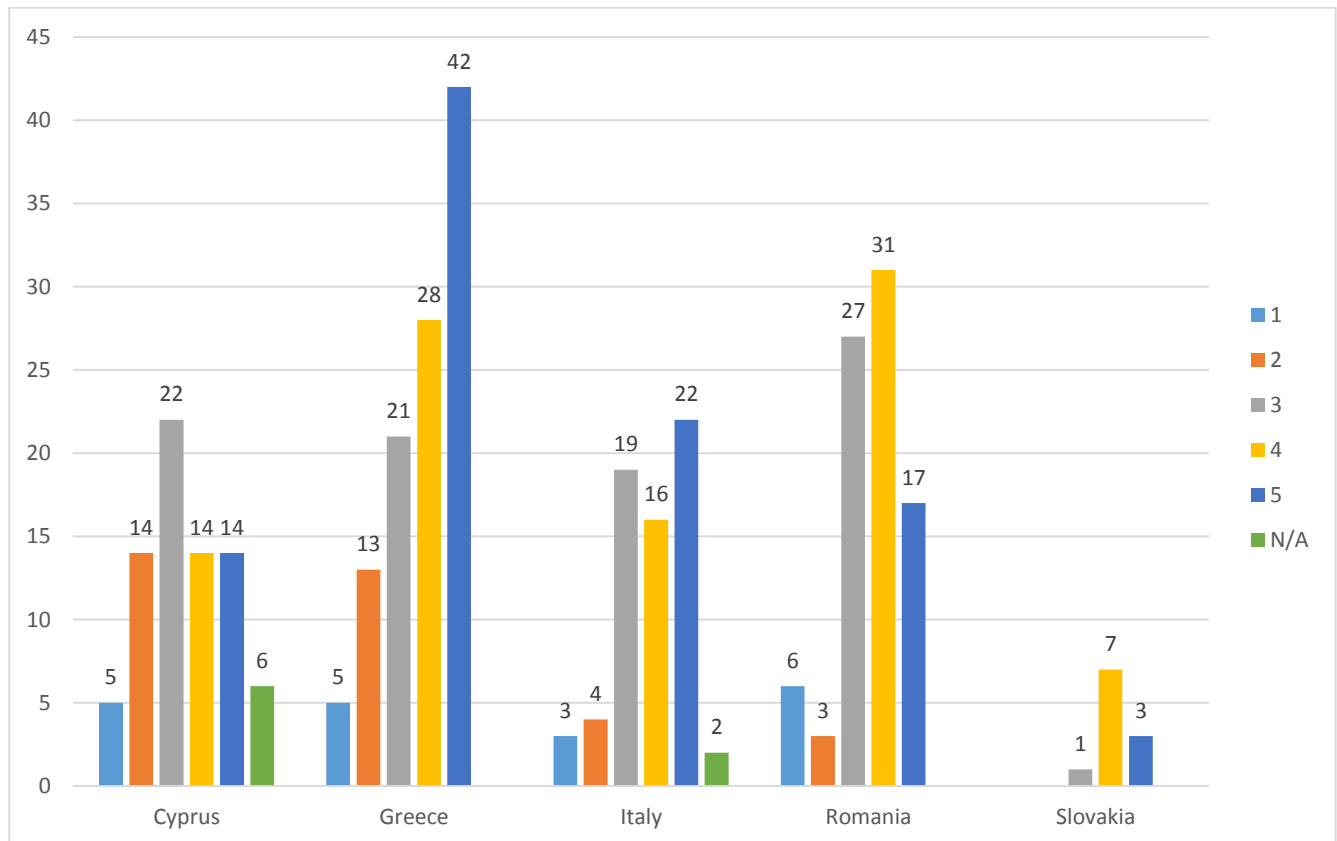| Count of 2. Please tick the box that best represents how you feel about the 3D virtual environment as a learning tool to study Physics [b. Impact on learning performance]							
	1	**2**	**3**	**4**	**5**	**N/A**	**Grand Total**
Cyprus	3	6	13	25	20	8	75
Greece	10	6	16	28	49		109
Italy	4	2	16	17	24	3	66
Romania	4	6	12	31	31		84
Slovakia		1	2	7	1		11
Grand Total	**21**	**21**	**59**	**108**	**125**	**11**	**345**

In terms of impact on learning performance, 68% agreed with the high impact of 3D virtual worlds in the learning process, while only 12% disapproved of their impact. Respondents in Greece and Romania highlighted the high impact of this learning method, followed by Cyprus and Italy. The distribution of positive responses across all countries was higher than negative responses.

c. Knowledge improvement on the Physics topic of the scenario

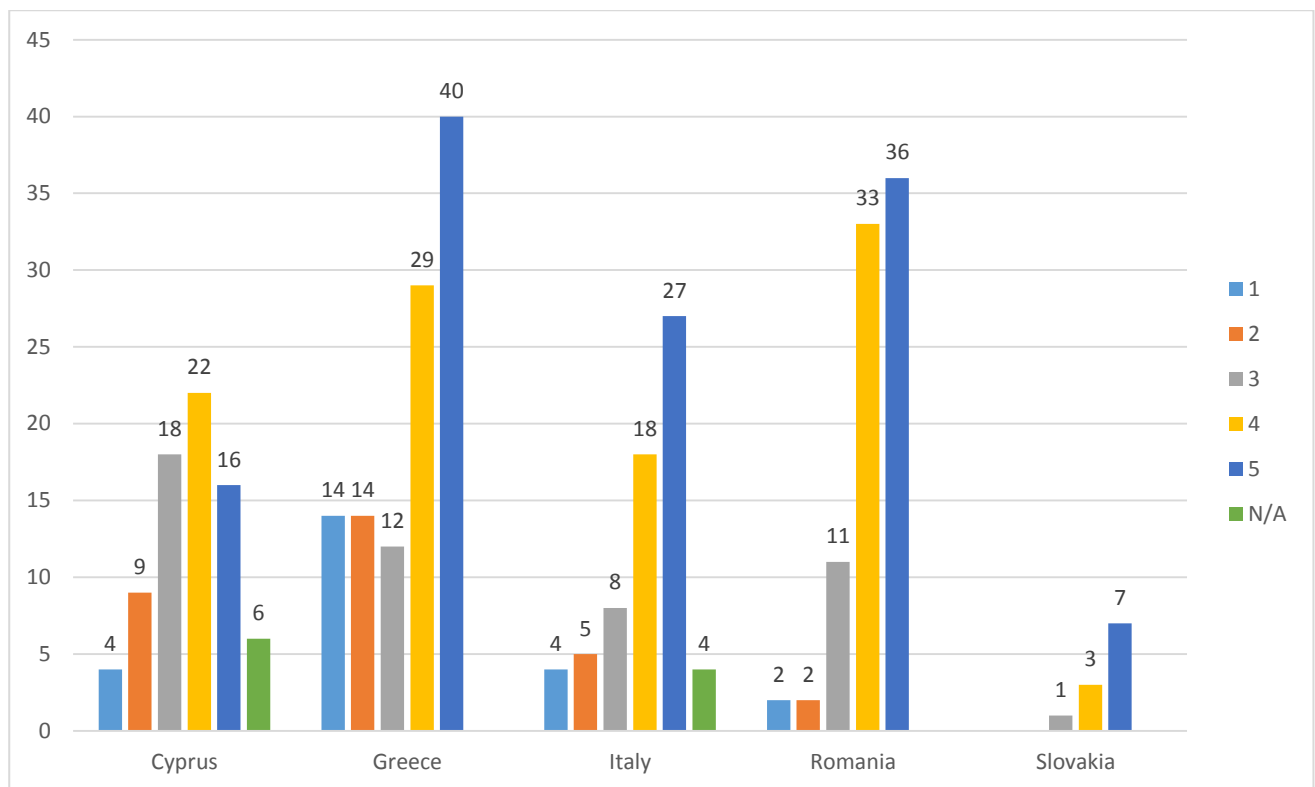| Count of 2. Please tick the box that best represents how you feel about the 3D virtual environment as a learning tool to study Physics [c. Knowledge improvement on the Physics topic of the scenario]							
	1	**2**	**3**	**4**	**5**	**N/A**	**Grand Total**
Cyprus	5	14	22	14	14	6	75
Greece	5	13	21	28	42		109
Italy	3	4	19	16	22	2	66
Romania	6	3	27	31	17		84
Slovakia			1	7	3		11
Grand Total	**19**	**34**	**90**	**96**	**98**	**8**	**345**

As can be seen from the previous table, 56% considered Physics study through 3D virtual worlds to be a good experience, while only 15% felt they did not help this type of learning. In Greece and Romania, the highest positive response rates are recorded, while in Italy and Cyprus the rates are lower and in Slovakia the lowest.

d. Recommend this learning tool to a friend

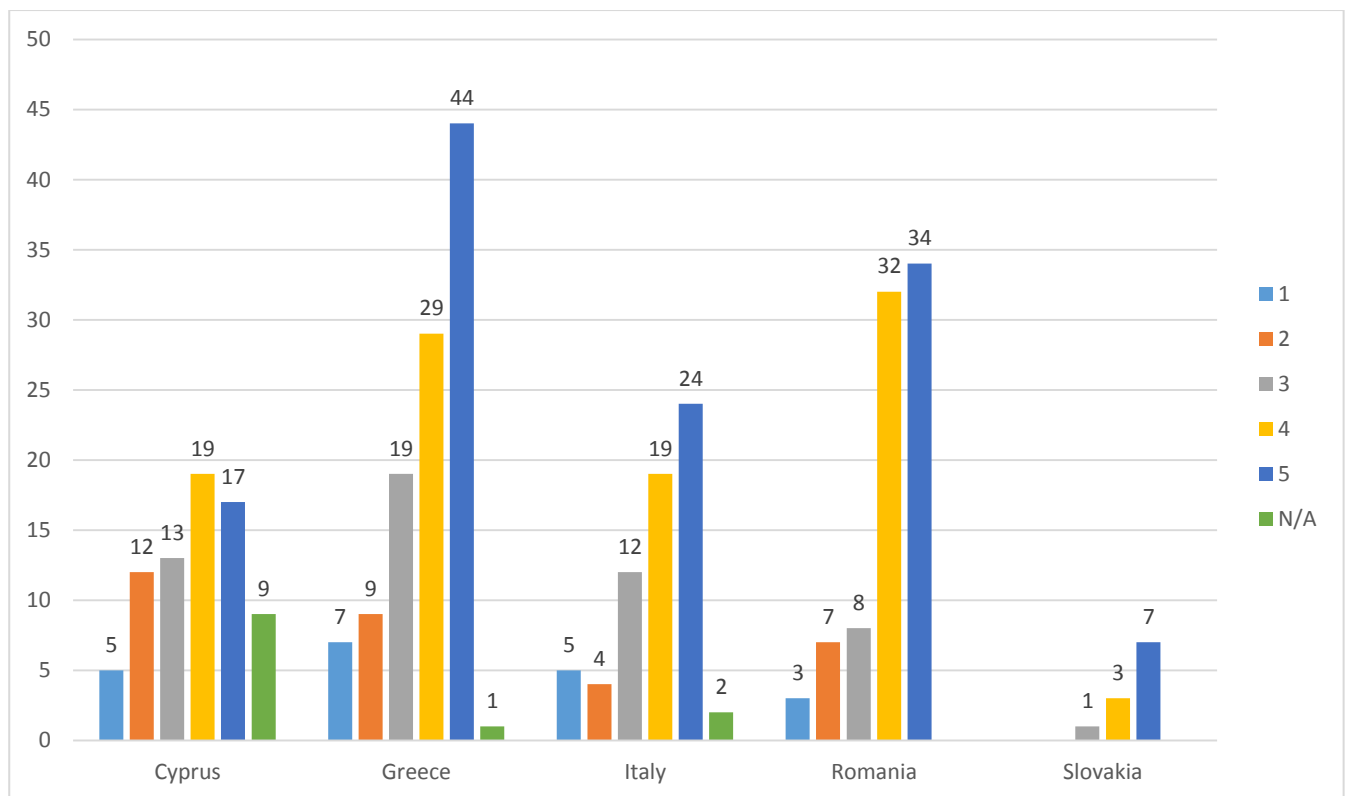| Count of 2. Please tick the box that best represents how you feel about the 3D virtual environment as a learning tool to study Physics [d. Recommend this learning tool to a friend]							
	1	**2**	**3**	**4**	**5**	**N/A**	**Grand Total**
Cyprus	4	9	18	22	16	6	75
Greece	14	14	12	29	40		109
Italy	4	5	8	18	27	4	66
Romania	2	2	11	33	36		84
Slovakia			1	3	7		11
Grand Total	**24**	**30**	**50**	**105**	**126**	**10**	**345**

As can be seen from the previous table, 67% of respondents think they will recommend 3D virtual worlds to other friends to study Physics, while only 16% will not recommend virtual worlds. Regarding the increased recommendation rate, it is registered in Greece and Romania, followed by Italy and Cyprus.

e. Learning experience offered

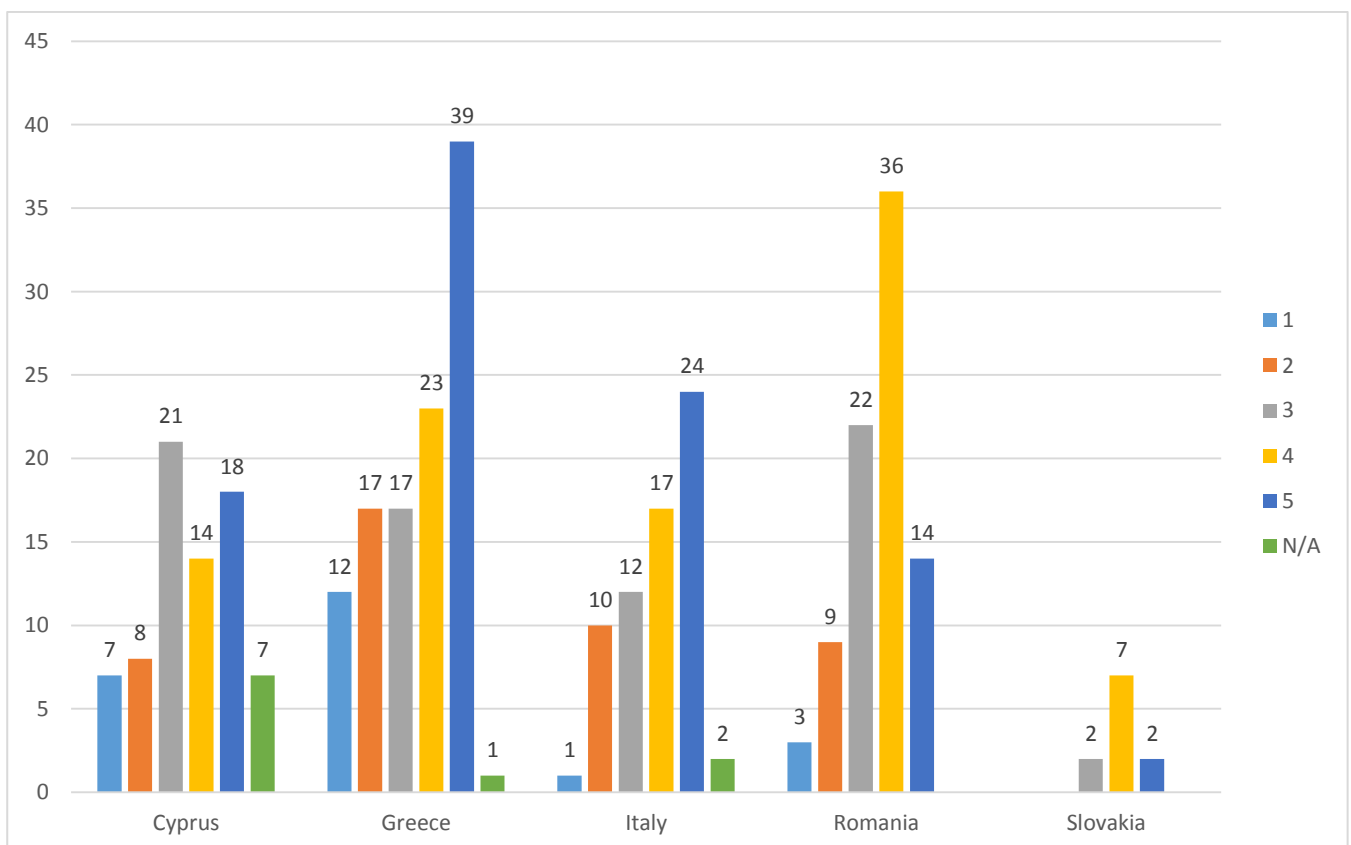| Count of 2. Please tick the box that best represents how you feel about the 3D virtual environment as a learning tool to study Physics [e. Learning experience offered]							
	1	**2**	**3**	**4**	**5**	**N/A**	**Grand Total**
Cyprus	5	12	13	19	17	9	75
Greece	7	9	19	29	44	1	109
Italy	5	4	12	19	24	2	66
Romania	3	7	8	32	34		84
Slovakia			1	3	7		11
Grand Total	**20**	**32**	**53**	**102**	**126**	**12**	**345**

Regarding the learning experience of 3D virtual worlds, 66% of respondents said it was positive, while only 15% considered it to be a negative experience. The countries with the highest positive impact rate are Greece and Romania, while Cyprus and Italy have a moderate rate, and Slovakia the smallest.

f. Increase chances of performing better in the Physics class

| **Count of 2. Please tick the box that best represents how you feel about the 3D virtual environment as a learning tool to study Physics [f. Increase chances of performing better in the Physics class]**							
	1	**2**	**3**	**4**	**5**	**N/A**	**Grand Total**
Cyprus	7	8	21	14	18	7	75
Greece	12	17	17	23	39	1	109
Italy	1	10	12	17	24	2	66
Romania	3	9	22	36	14		84
Slovakia			2	7	2		11
Grand Total	**23**	**44**	**74**	**97**	**97**	**10**	**345**

As can be seen from the previous table, 56% of respondents believe that virtual worlds significantly increase their chances of improving Physics performance, while 19% believe that the impact of virtual worlds on performance enhancement in Physics study is low. Greece and Romania record the highest rate of agreement on the positive impact, while Cyprus and Italy have an average rate, and Slovakia has a very low rate. Also, 2% of respondents did not consider it appropriate to answer this question.

g. Change the opinion for the Physics topic

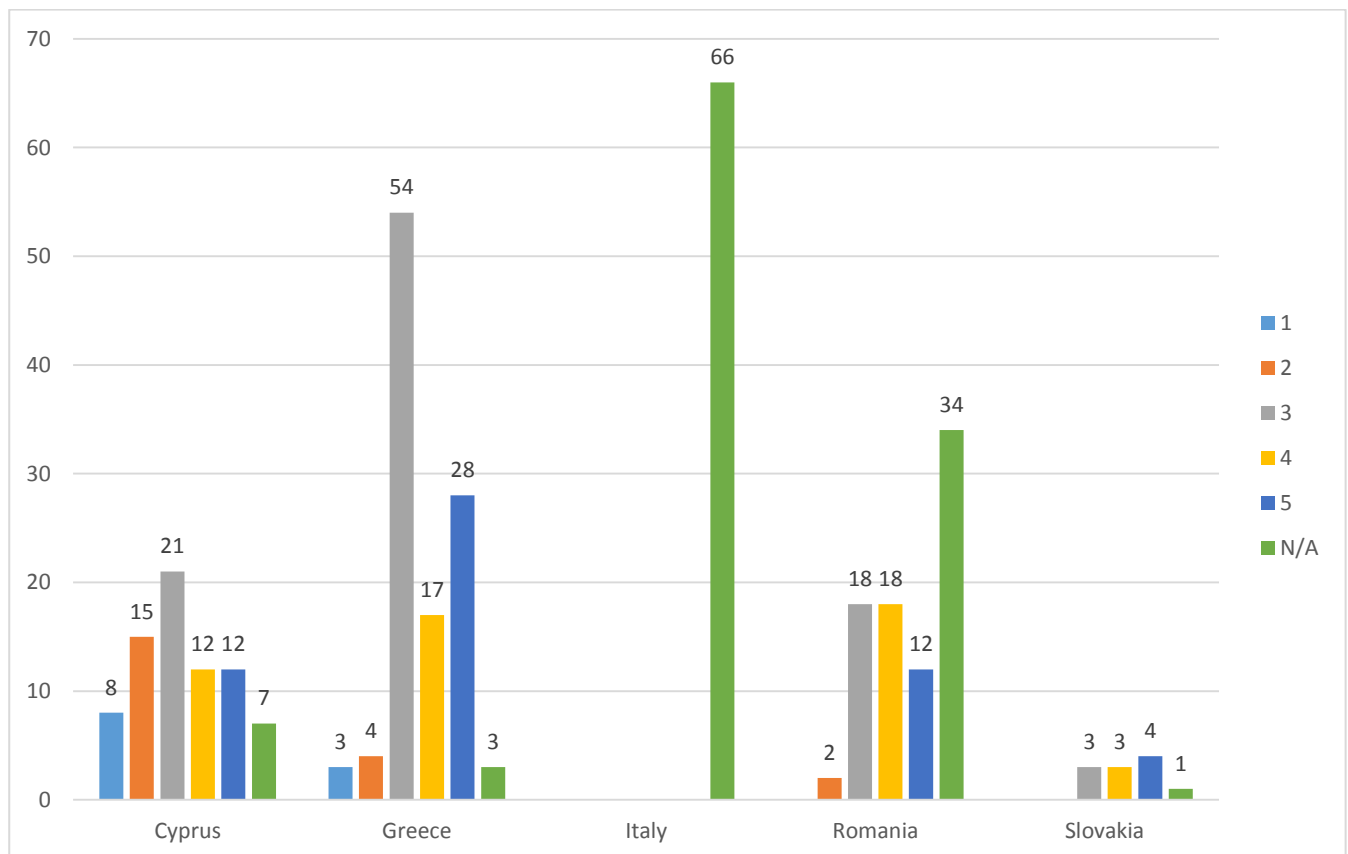| Count of 2. Please tick the box that best represents how you feel about the 3D virtual environment as a learning tool to study Physics [g. Change the opinion for the Physics topic]							
	1	**2**	**3**	**4**	**5**	**N/A**	**Grand Total**
Cyprus	11	11	22	13	12	6	75
Greece	2	4	46	27	27	3	109
Italy						66	66
Romania		4	20	16	10	34	84
Slovakia			3	5	2	1	11
Grand Total	**13**	**19**	**91**	**61**	**51**	**110**	**345**
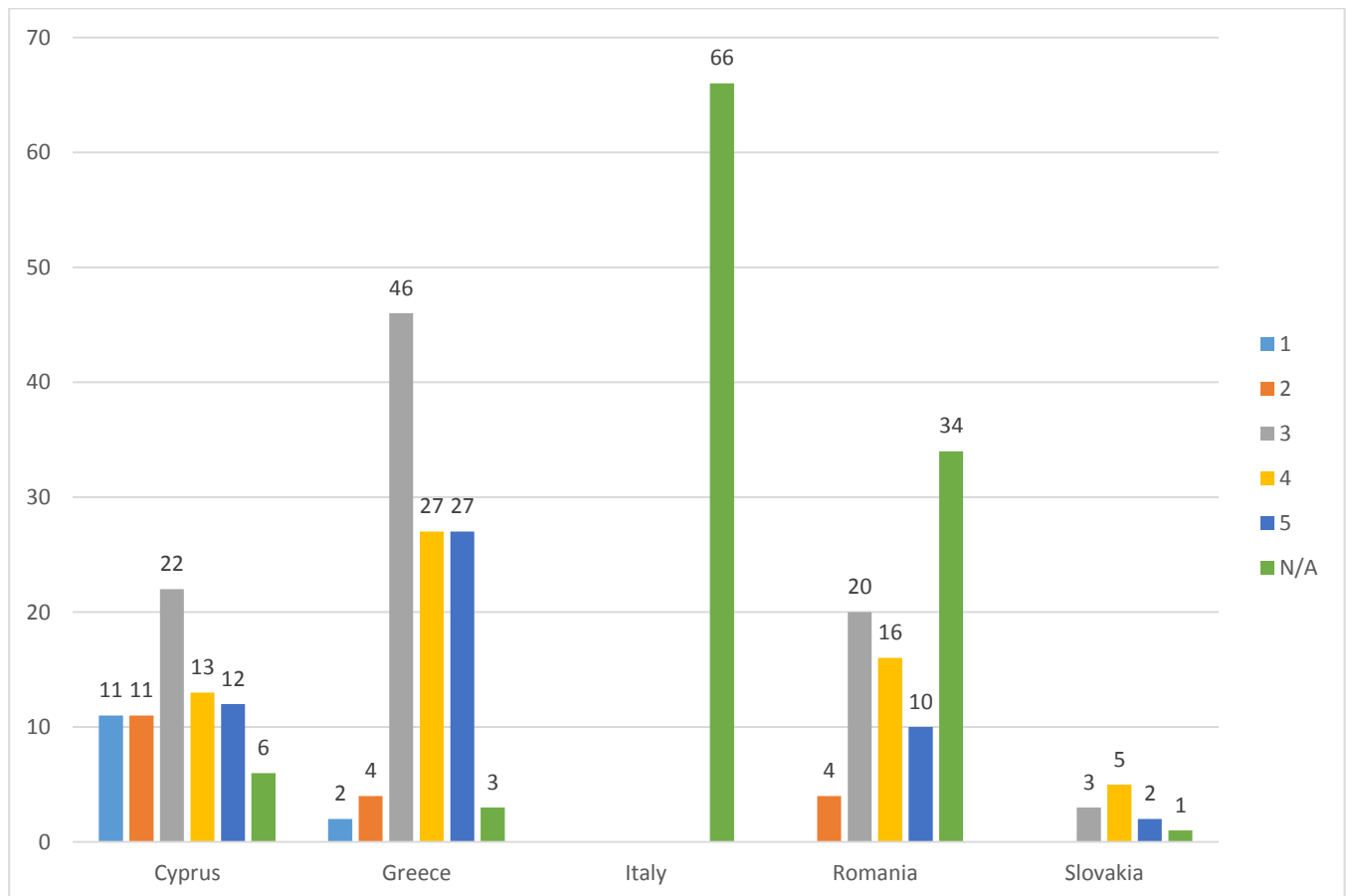
Regarding the change of opinion on the topics approached, 32% of the respondents consider that the 3D virtual worlds have changed their opinion on the subjects of physics approached, 18% considered that they did not influence them in anyway, and 32% felt that it was not appropriate to answer this question. In Italy, all respondents declined to answer the question, following Romania with an increased refusal rate. At Greece's level, there was

the highest rate of agreement in terms of changing views on the issues addressed, while in Cyprus the distribution of responses was almost equal.

h. Raise the interest in Physics

| **Count of 2. Please tick the box that best represents how you feel about the 3D virtual environment as a learning tool to study Physics [h. Raise the interest in Physics]**							
	1	**2**	**3**	**4**	**5**	**N/A**	**Grand Total**
Cyprus	8	15	21	12	12	7	75
Greece	3	4	54	17	28	3	109
Italy						66	66
Romania		2	18	18	12	34	84
Slovakia			3	3	4	1	11
Grand Total	**11**	**21**	**96**	**50**	**56**	**111**	**345**

As can be seen from the previous table, 31% of respondents considered that their interest in the study of physics increased after using 3D virtual worlds, while only 9% said their interest did not increase. It is noted that in Italy the respondents did not want to answer this question, the lack of response being 32% in all countries. Greece and Romania show an increased interest in the study of physics. In Slovakia, no respondent stated that his interest in the study of physics is low.

i. Motivation to learn more on Physics

Count of 2. Please tick the box that best represents how you feel about the 3D virtual environment as a learning tool to study Physics [i. Motivation to learn more on Physics]							
	1	**2**	**3**	**4**	**5**	**N/A**	**Grand Total**
Cyprus	12	9	18	19	10	7	75
Greece	2	6	53	21	25	2	109
Italy						66	66
Romania		5	19	19	7	34	84
Slovakia			2	7	2		11
Grand Total	**14**	**20**	**92**	**66**	**44**	**109**	**345**
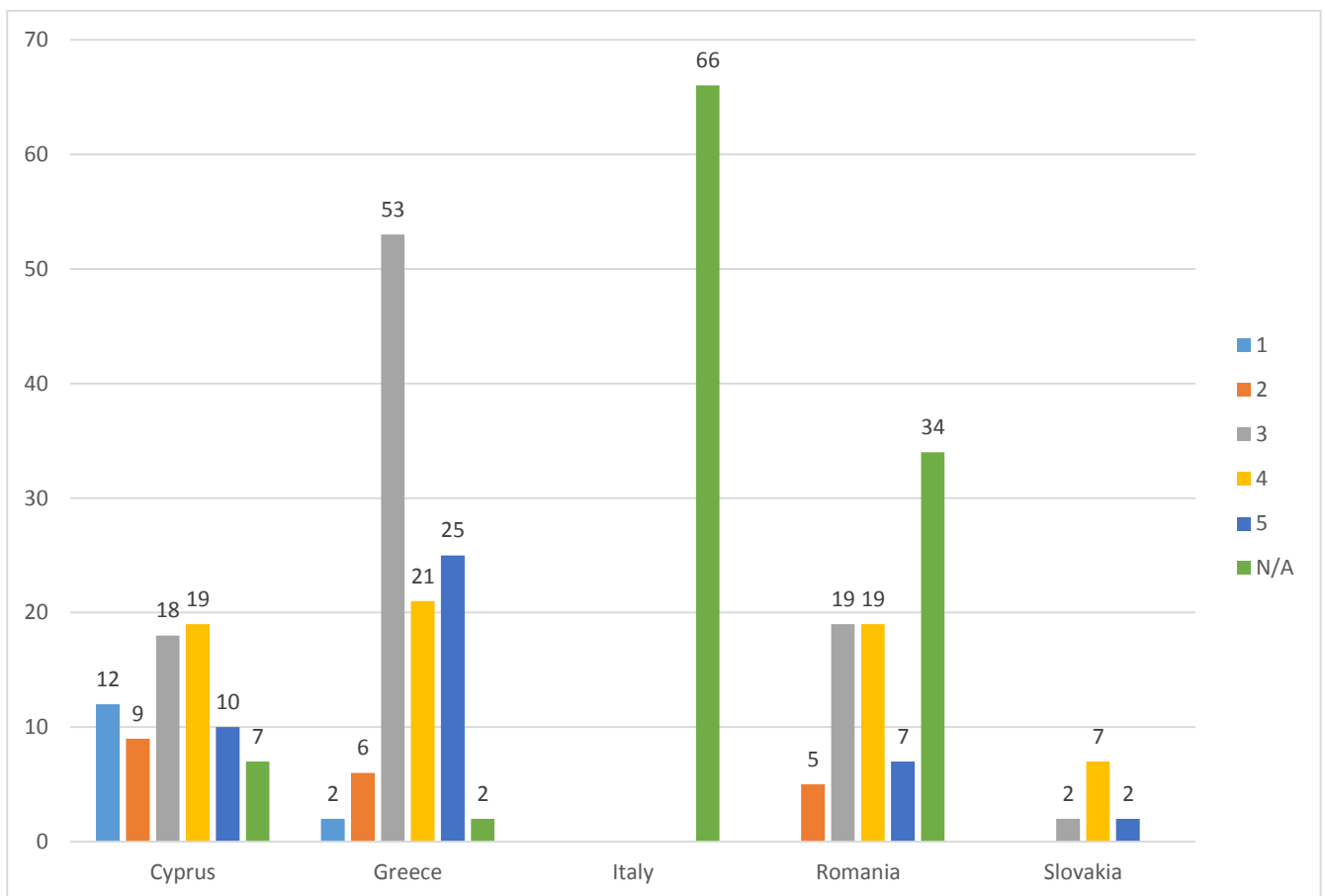
In terms of motivation for the study of physics, 32% of respondents said that the virtual worlds have increased their motivation, 32% of respondents did not want to answer this question, while 27% considered that the 3D virtual worlds have in no way influenced the motivation to study physics. It is noted that in Italy no respondent wanted to answer this question, being followed by respondents from Romania. Greece and Cyprus recorded high rates of motivation growth compared to the rest of the countries.