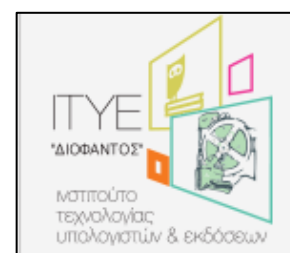|	
Deliverable Number	**Report III**
Deliverable Title	**Piloting Results**
Intellectual Output Title	**Intellectual Output II: Virtual 3D World for Teaching Physics**
Activity description	**The report presents the results of the pilot in Romania.**
Authors (per company, if more than one company provide 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) in Romania. 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 (85 respondents, about 25% from all the respondents at the project level) 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	**35**
Romania	35
Male	**48**
Romania	48
Prefer not to say	**1**
Romania	1
Grand Total	**84**
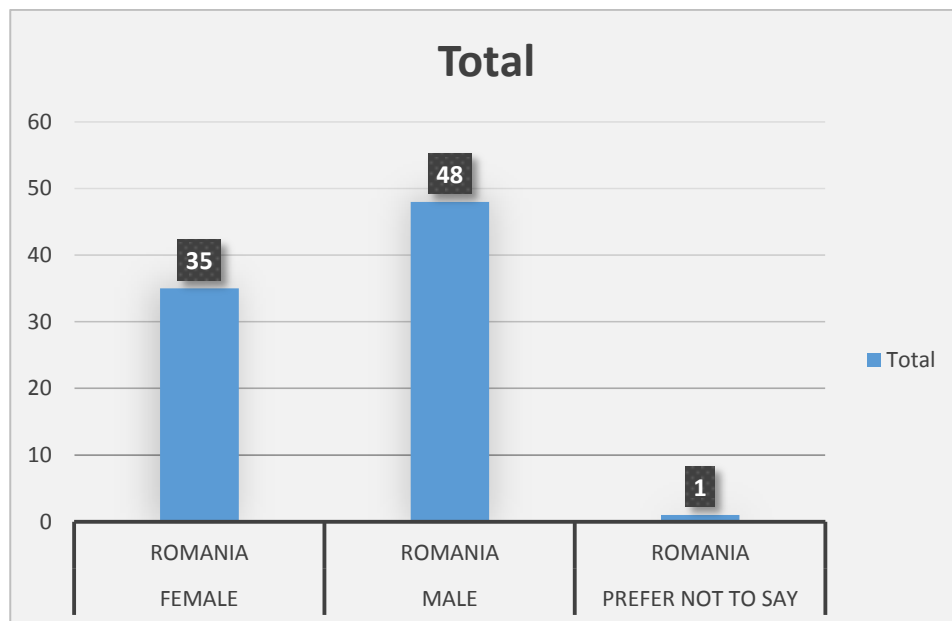
As can be seen from the above data, of the total number of respondents, 42% are women and 57% are men, the questionnaire being applied equally between the sexes.

2. Age Group:

Count of 4. Rate from 1 to 7 how much you like Physics:	
Romania	**84**
12->14	33
15 ->17	49
9->11	2
Grand Total	**84**
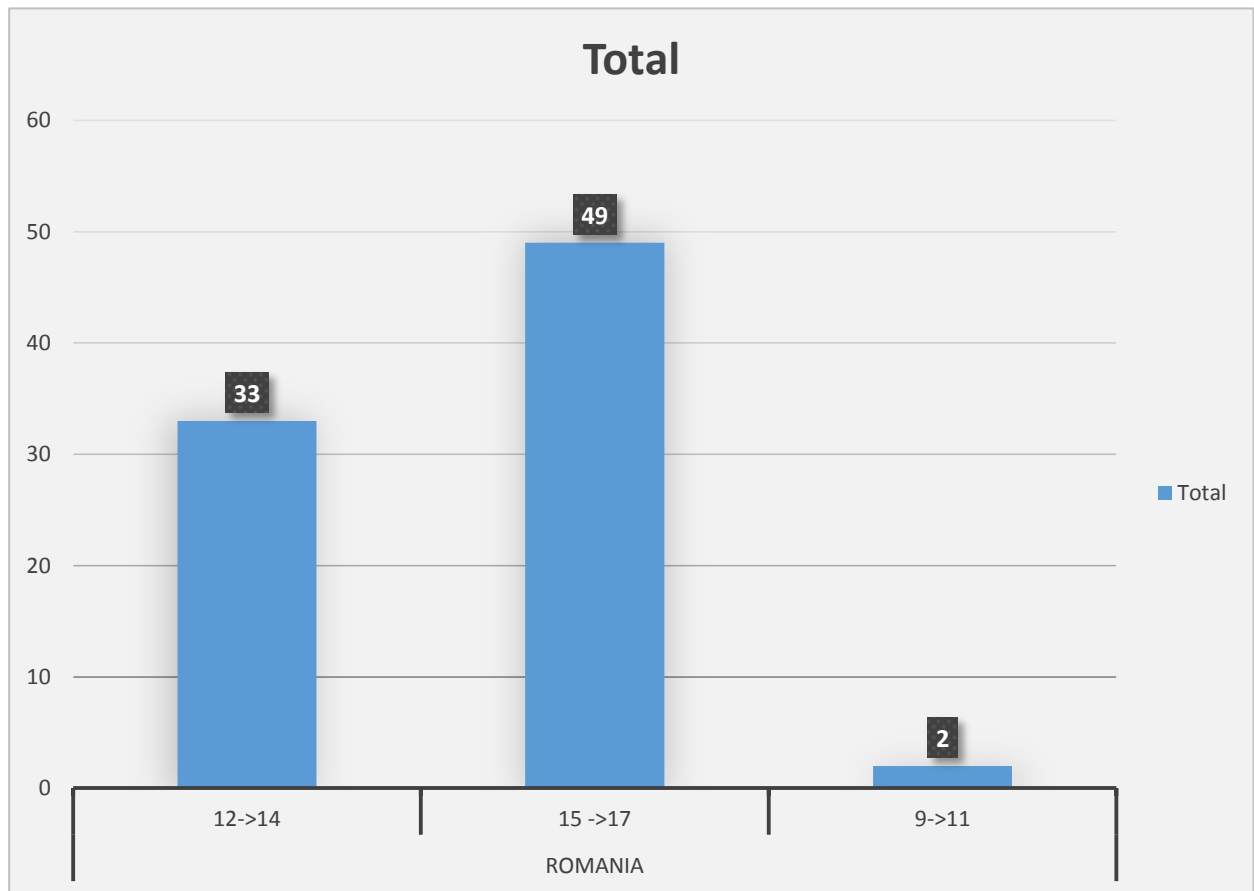
At the level of the project, it can be seen that in Romania piloting was performed on all three age groups (12-> 14; 15 -> 17; 9-> 11), the age group with the highest rate of response being 15-> 17 years group (58%).
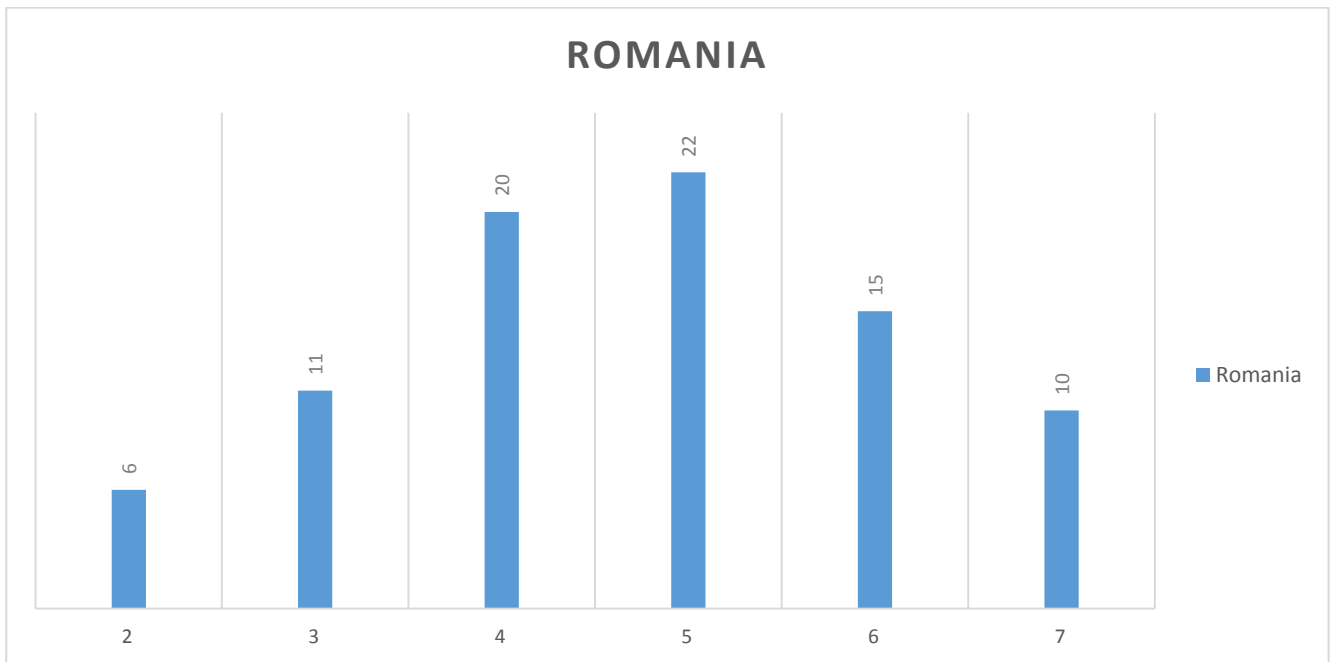
3. Participants per Country:

	Count of 3. Country:
Romania	84
Grand Total	**84**
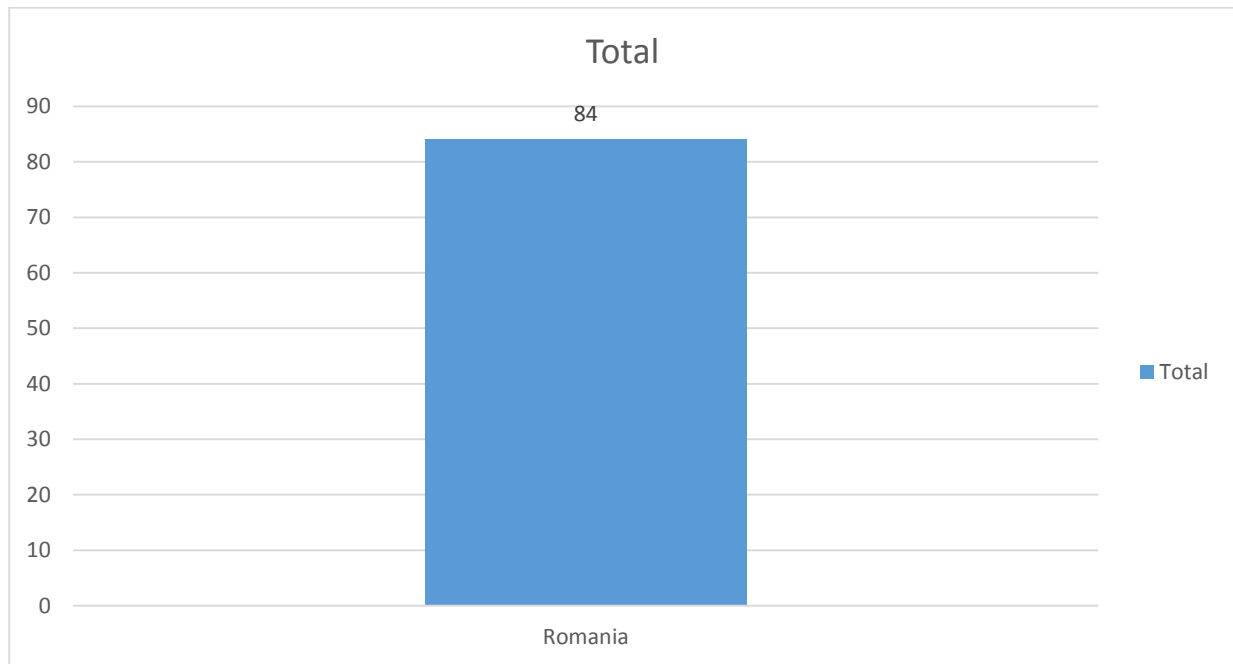
The total number of respondents is 84, approximate 24% from all the respondents at the project level.

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

Count of 4. Rate from 1 to 7 how much you like Physics:	Romania	Grand Total
2	6	6
3	11	11
4	20	20
5	22	22
6	15	15
7	10	10
Grand Total	**84**	**84**

Most of the respondents (56%) said they like to study physics, while 13% have a fairly high interest in this subject, and only 24% are neither excited nor disliked by the study of physics.

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:								
	2	**3**	**4**	**5**	**6**	**7**	**Grand Total**	
Romania	6	4	23	29	18	4		84
Grand Total	**6**	**4**	**23**	**29**	**18**	**4**		**84**
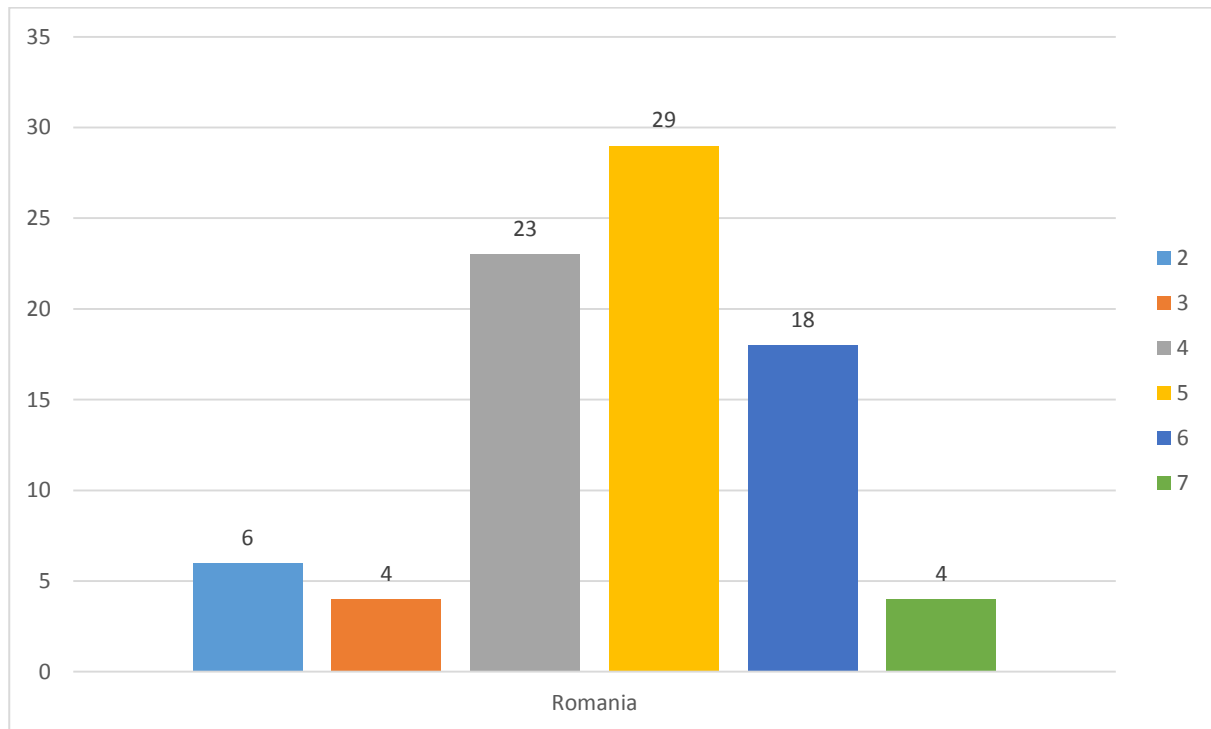
61% of the total number of respondents show increased interest in attending physics events or competitions, while 27% don`t know exactly if they want to participate in events and 12% show low interest in participating in this type of events.

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:						
	3	**4**	**5**	**6**	**7**	**Grand Total**
Romania	1	6	18	23	36	84
Grand Total	**1**	**6**	**18**	**23**	**36**	**84**
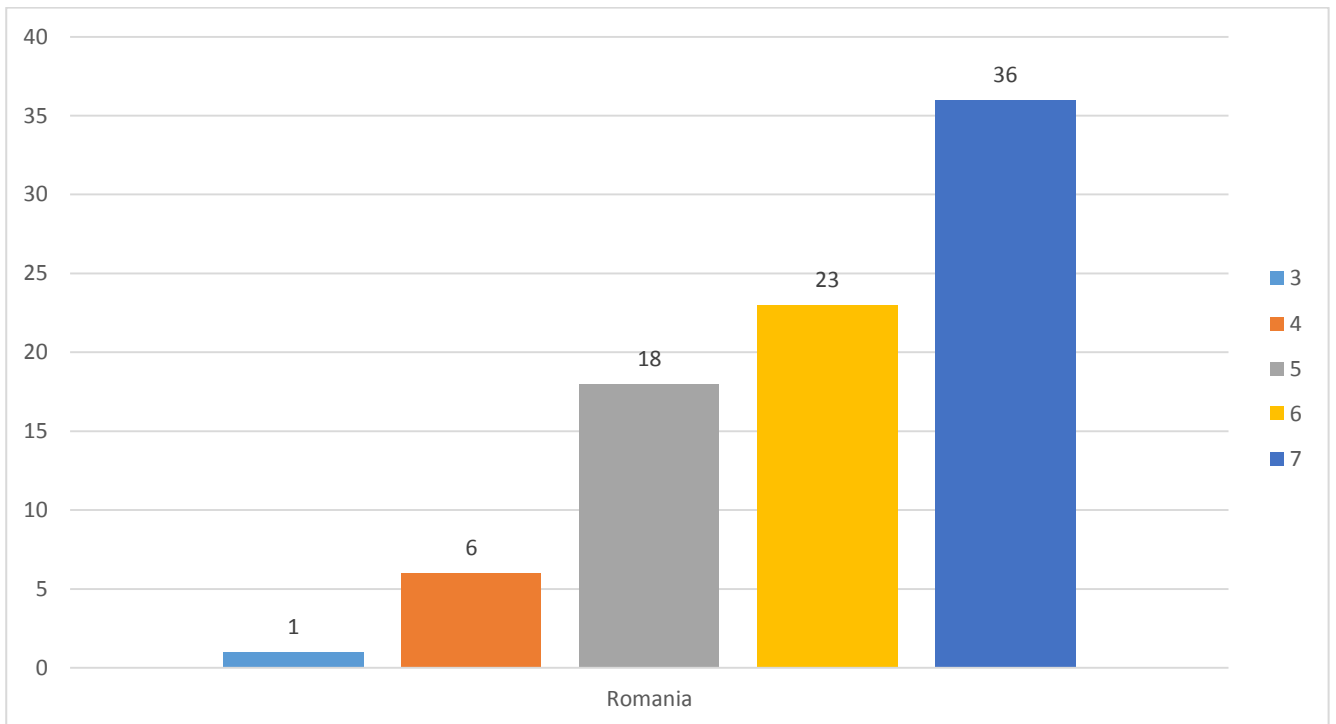
Of the total of respondents, 92% were excited to attend the event, 7% showed moderate interest and only 1% showed total disinterest.

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

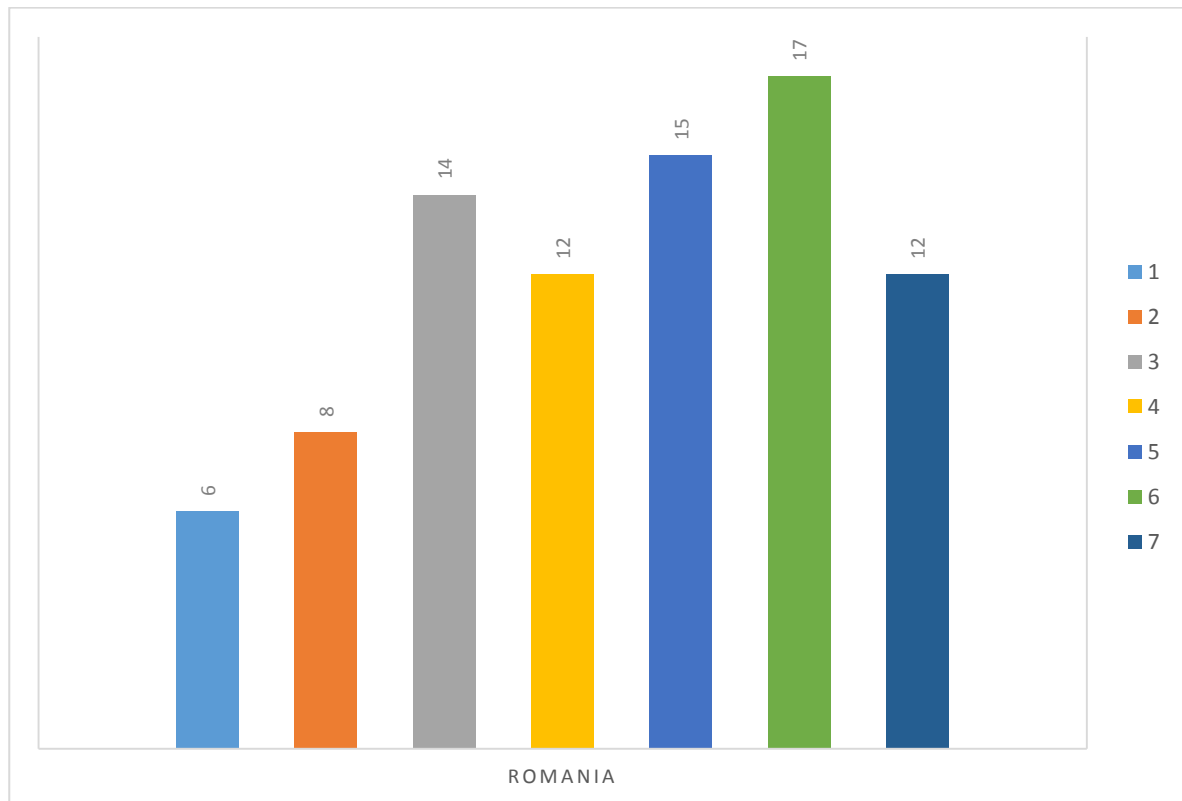| Count of 8. A 7-point Likert scale ranging from 1 to 7 is used to evaluate how often you play videogames and which types of videogames you prefer.								
	1	2	3	4	5	6	7	Grand Total
Romania	6	8	14	12	15	17	12	84
Grand Total	**6**	**8**	**14**	**12**	**15**	**17**	**12**	**84**
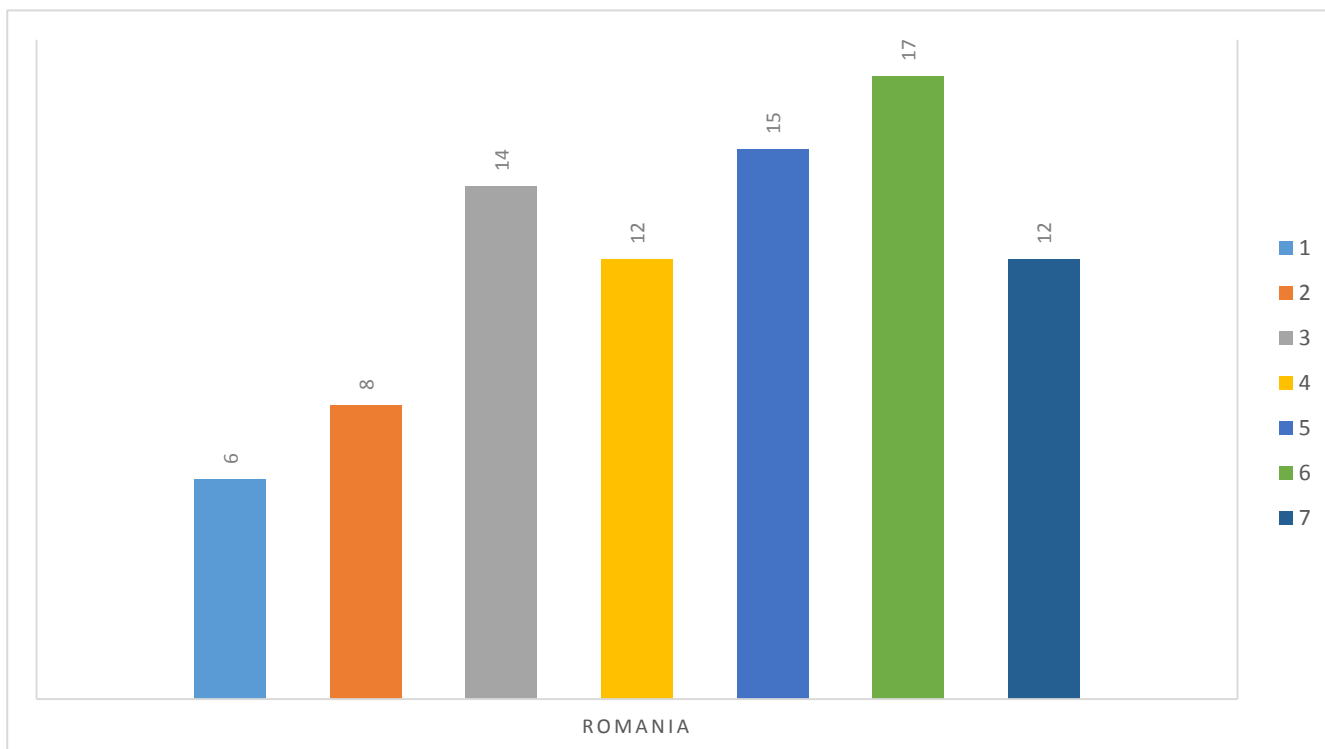
As can be seen from the above table, 52% of the total respondents have shown an increased interest in attending the annual Physics Olympics, 14% said they are indifferent, but they do not particularly want to participate and 33% of them showed low interest.

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?

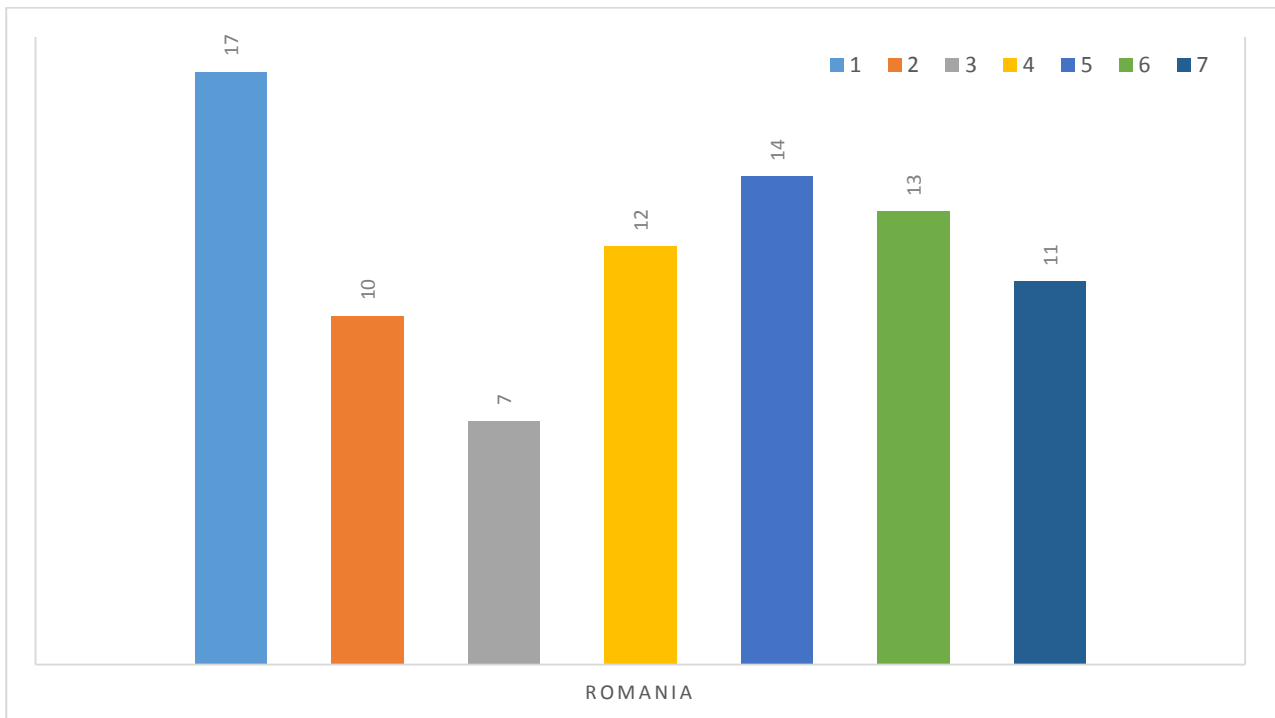| Count of 8. A 7-point Likert scale ranging from 1 to 7 is used to evaluate how often you play videogames and which types of videogames you prefer.								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**Grand Total**
Romania	6	8	14	12	15	17	12	84
Grand Total	**6**	**8**	**14**	**12**	**15**	**17**	**12**	**84**

In Romania there is a greater openness to use video games, 52% of respondents showed high interest in playing video games, 14% of them showed moderate interest and 33% showed low interest.

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

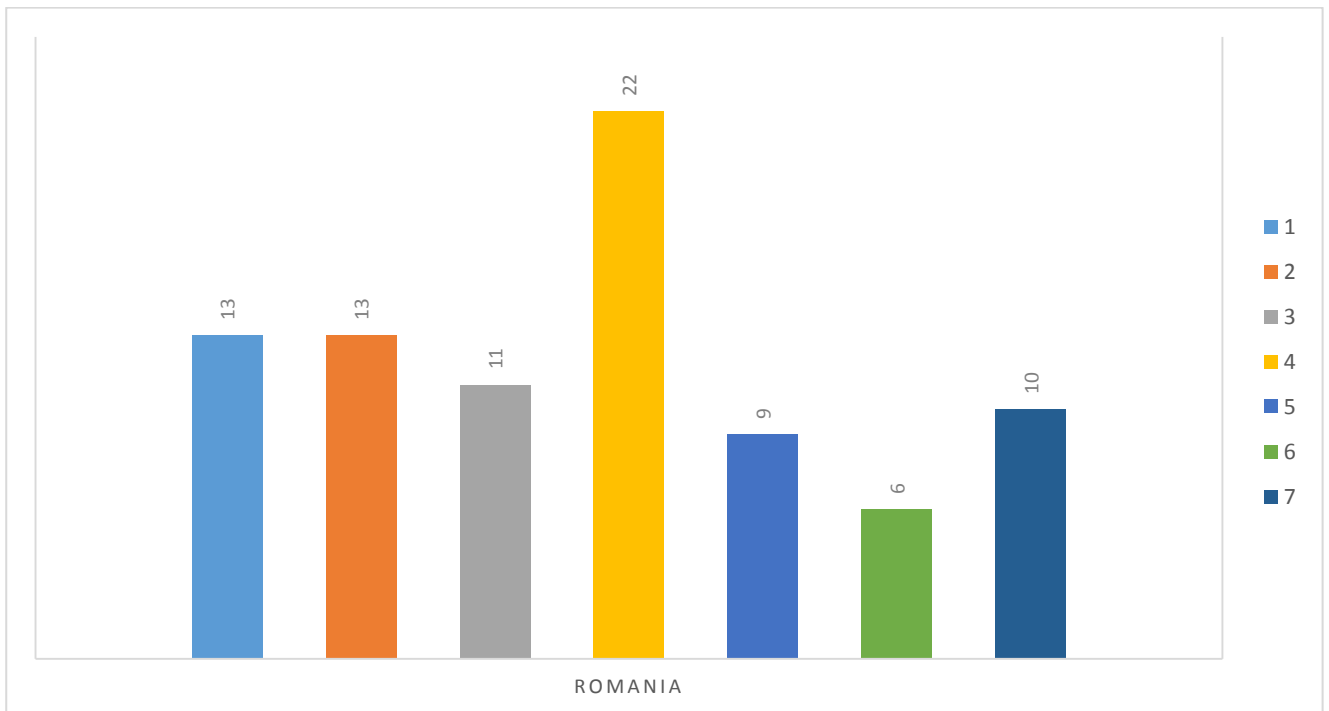| Count of 8. A 7-point Likert scale ranging from 1 to 7 is used to evaluate how often you play videogames and which types of videogames you prefer.								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**Grand Total**
Romania	17	10	7	12	14	13	11	84
Grand Total	**17**	**10**	**7**	**12**	**14**	**13**	**11**	**84**

In terms of interest in this type of games, 45% of the respondents said that are interested in, 14% neihter interested, nor disinterested and 40% are not interested. As you can see, the rates of interest and disinterest is quite similar.

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

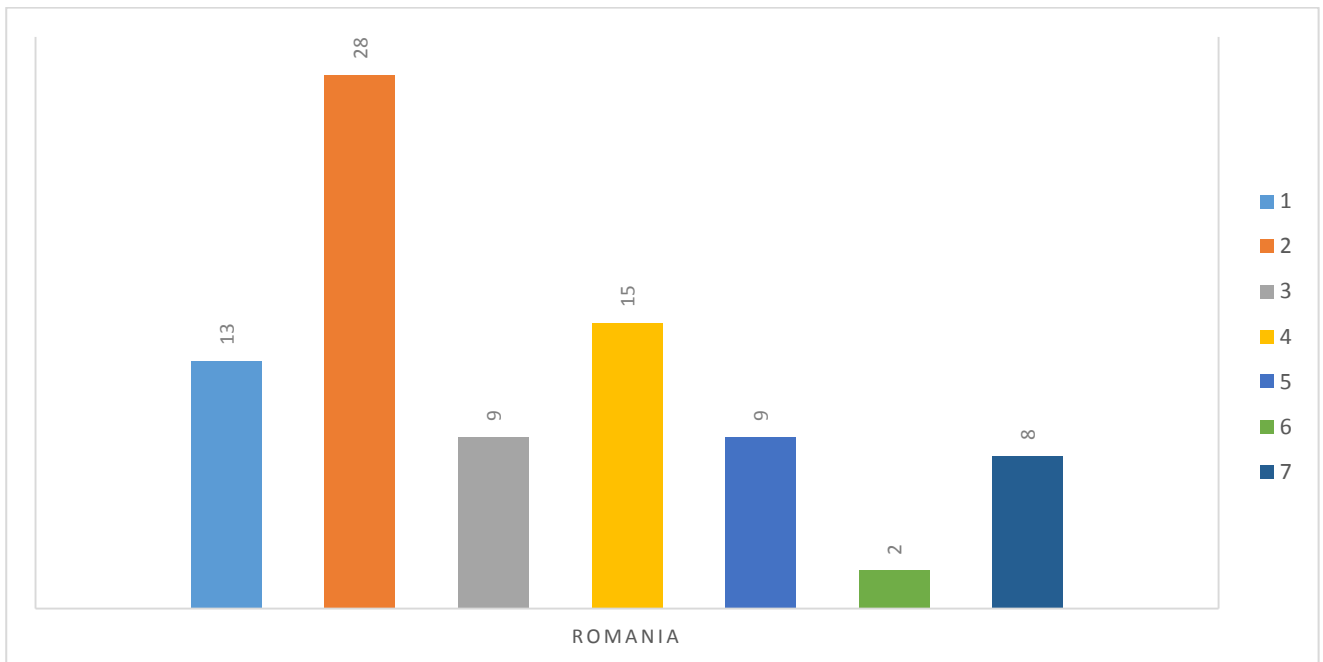| Count of 8. A 7-point Likert scale ranging from 1 to 7 is used to evaluate how often you play videogames and which types of videogames you prefer.								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**Grand Total**
Romania	13	13	11	22	9	6	10	84
Grand Total	**13**	**13**	**11**	**22**	**9**	**6**	**10**	**84**

In terms of interest in this type of games, 30% of the respondents said that are interested in, 26% neihter interested, nor disinterested and 44% are not interested. As you can see, the interest for this kind of game is likely low.

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

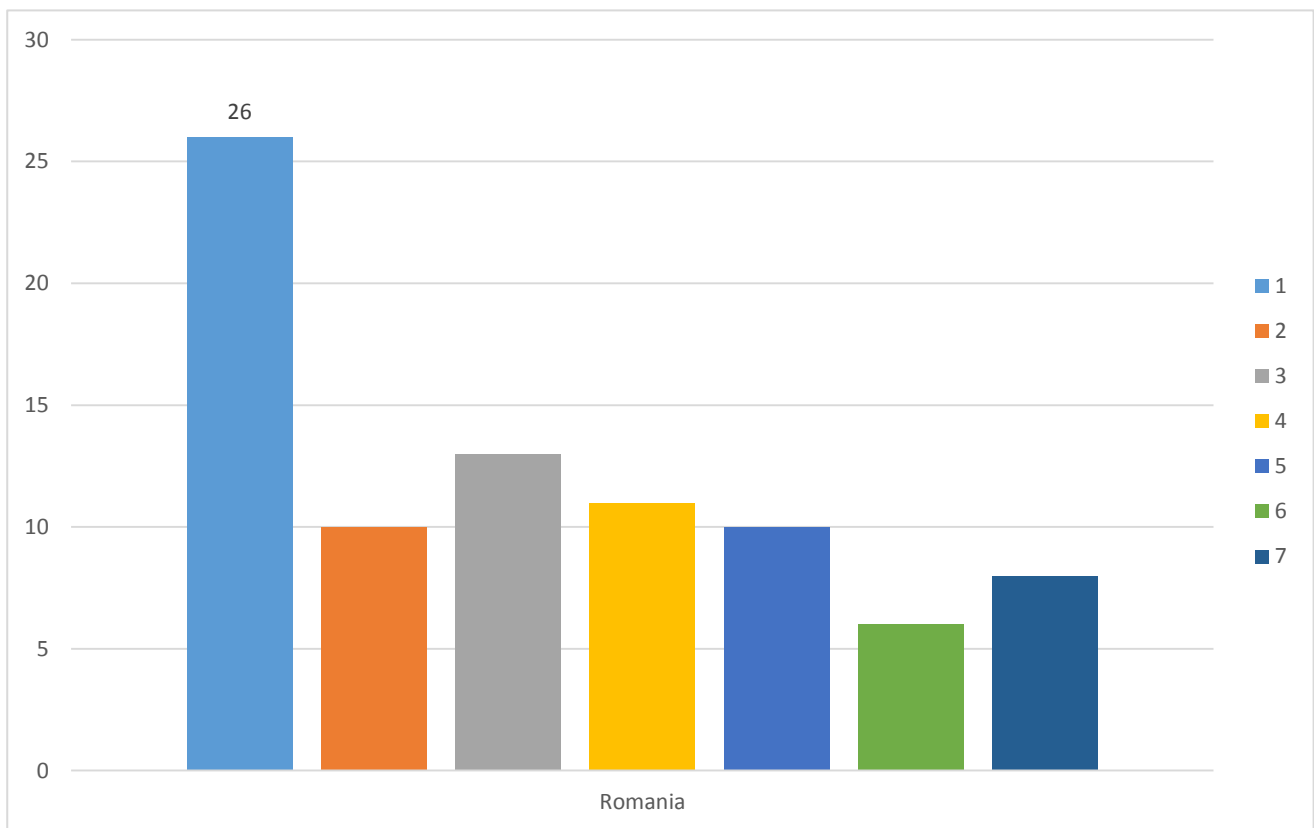| Count of 8. A 7-point Likert scale ranging from 1 to 7 is used to evaluate how often you play videogames and which types of videogames you prefer.									
	1	2	3	4	5	6	7	Grand Total	
Romania	13	28	9	15	9	2	8		84
Grand Total	**13**	**28**	**9**	**15**	**9**	**2**	**8**		**84**

As you can see in the table above, 14% of the respondents said that are interested in, 18% neihter interested, nor disinterested and 60% are not interested. As you can see, the interest for this kind of game is likely low.

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

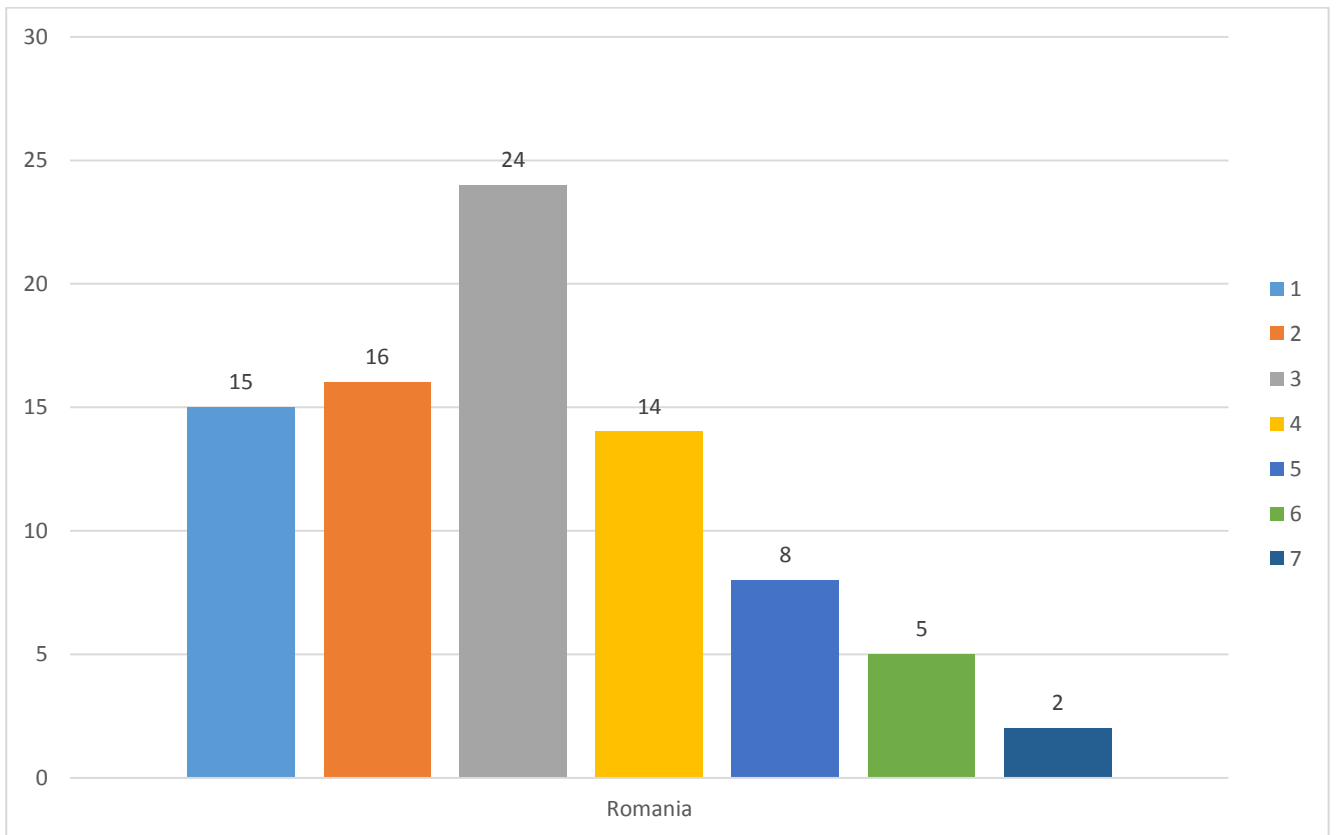| Count of 8. A 7-point Likert scale ranging from 1 to 7 is used to evaluate how often you play videogames and which types of videogames you prefer.								
	1	2	3	4	5	6	7	Grand Total
Romania	26	10	13	11	10	6	8	84
Grand Total	**26**	**10**	**13**	**11**	**10**	**6**	**8**	**84**

As you can see in the table above, 29% of the respondents said that are interested in, 13% neihter interested, nor disinterested and 58% are not interested. As you can see, the interest for this kind of game is likely low.

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

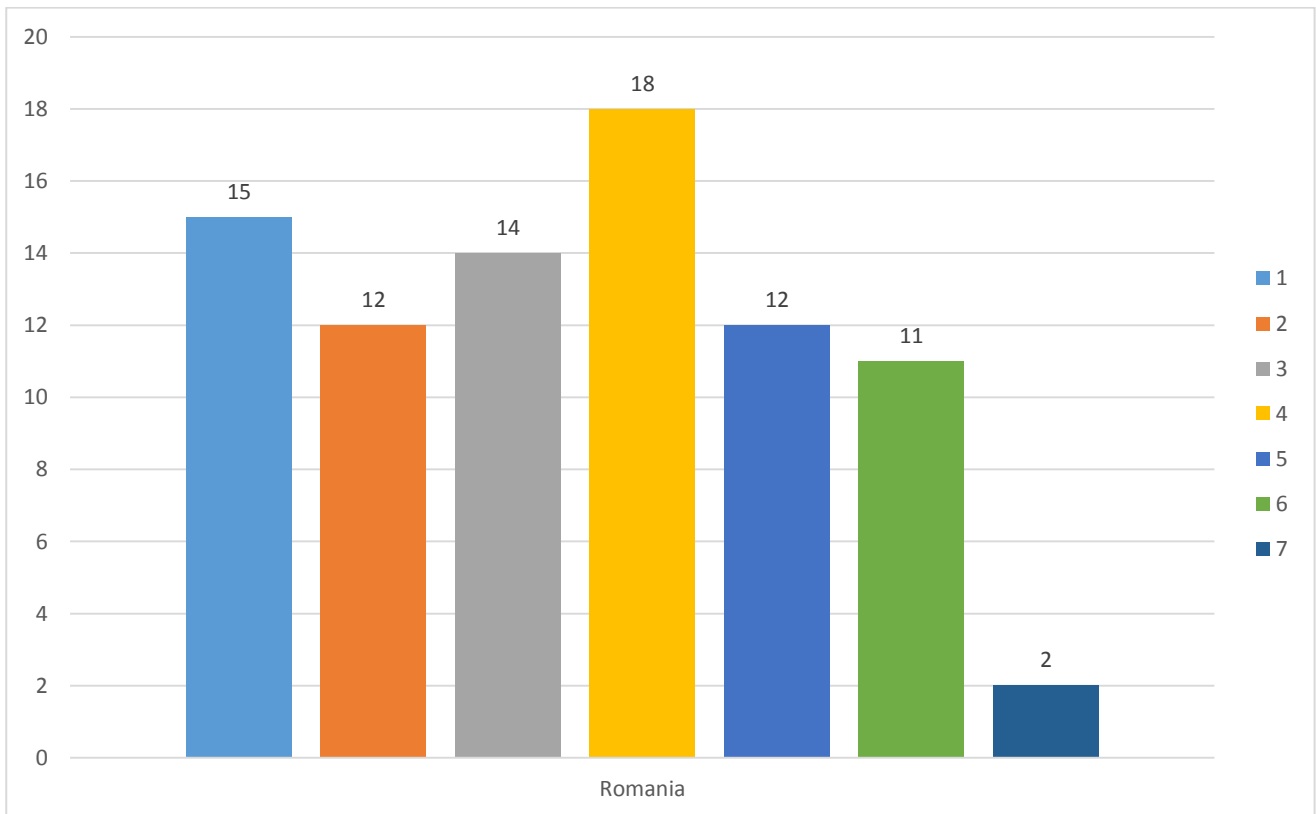| Count of 8. A 7-point Likert scale ranging from 1 to 7 is used to evaluate how often you play videogames and which types of videogames you prefer.								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**Grand Total**
Romania	15	16	24	14	8	5	2	84
Grand Total	**15**	**16**	**24**	**14**	**8**	**5**	**2**	**84**

As you can see in the table above, 18% of the respondents said that are interested in, 17% are neihter interested, nor disinterested and 65% are not interested. As you can see, the interest for this kind of game is likely low.

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

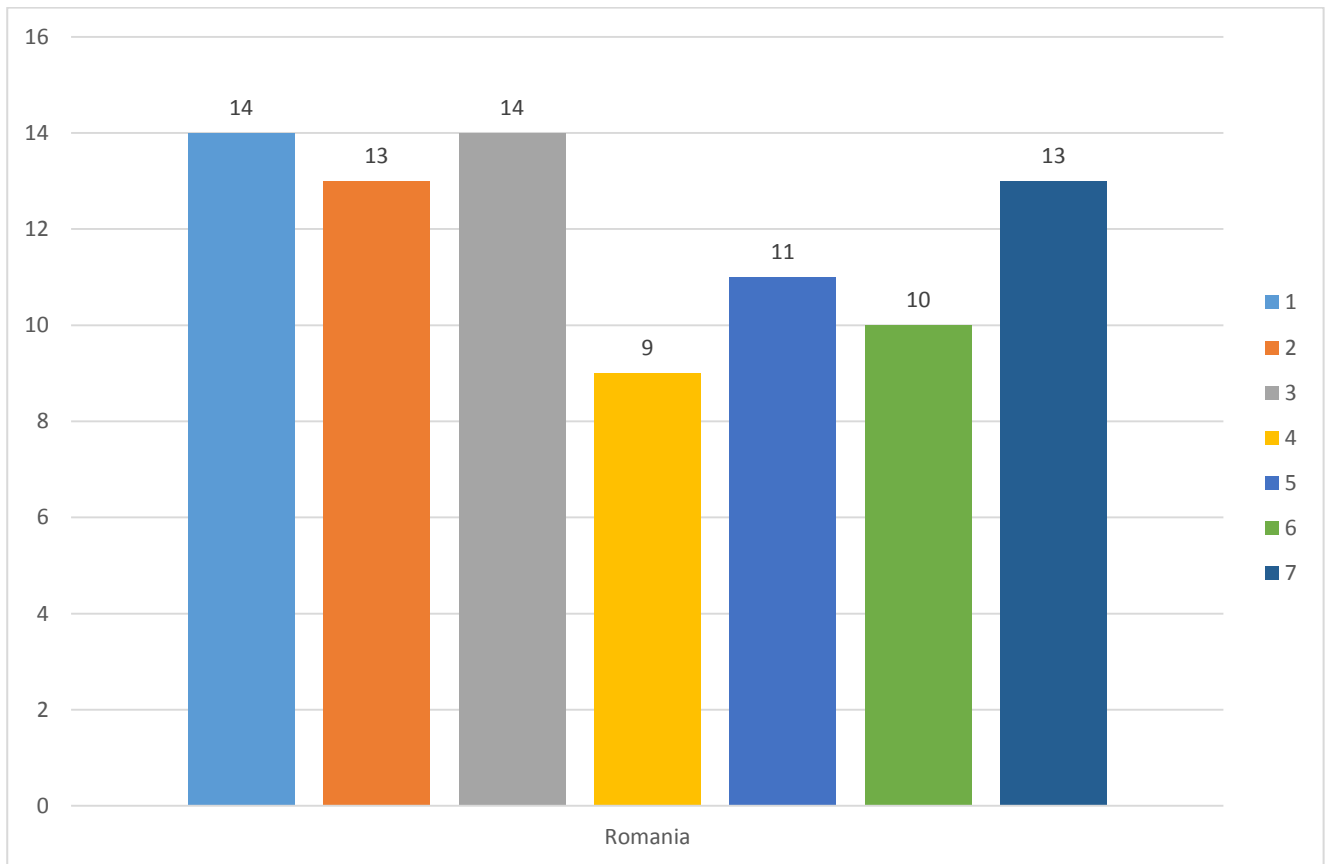| **Count of 8. A 7-point Likert scale ranging from 1 to 7 is used to evaluate how often you play videogames and which types of videogames you prefer.**								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**Grand Total**
Romania	15	12	14	18	12	11	2	84
Grand Total	**15**	**12**	**14**	**18**	**12**	**11**	**2**	**84**

As you can see in the table above, 30% of the respondents said that are interested in, 21% are neihter interested, nor disinterested and 49% are not interested. As you can see, the interest for this kind of game is likely low.

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

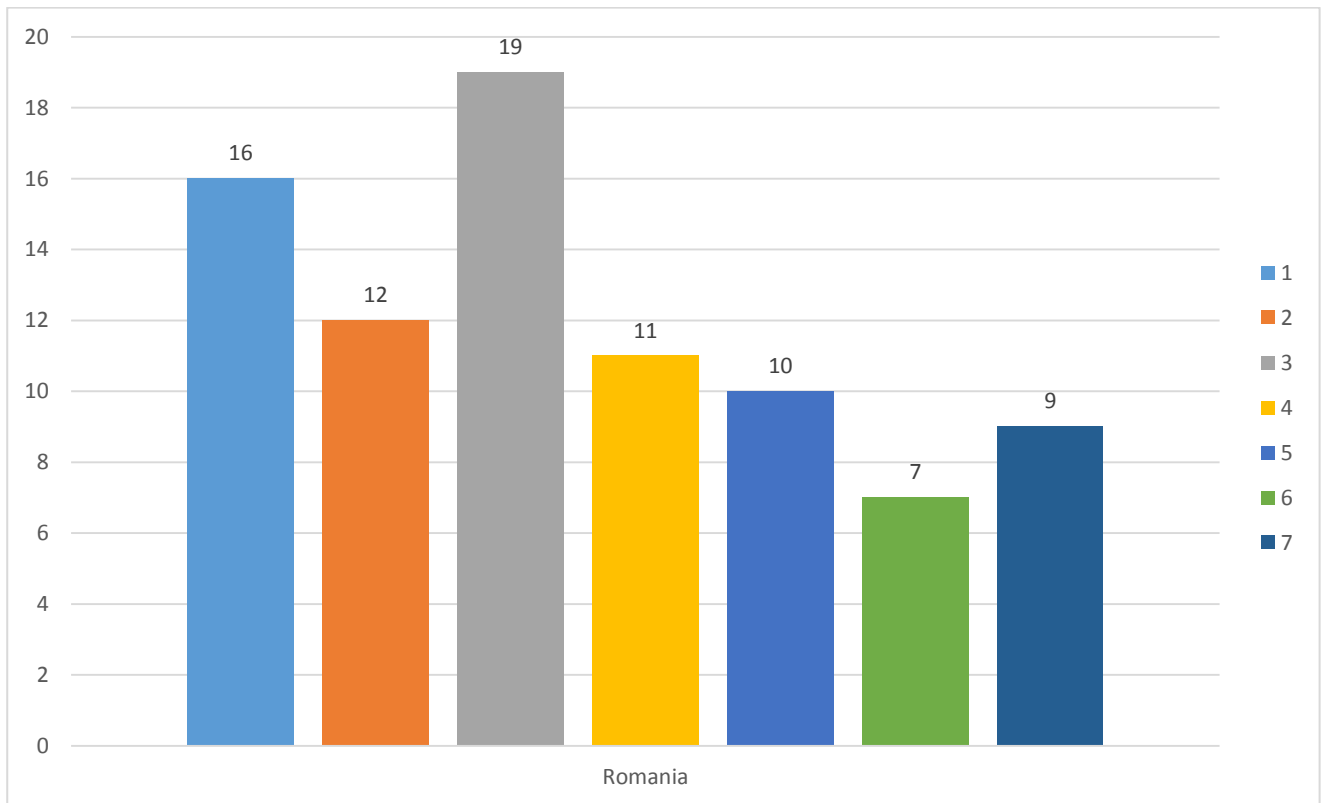| Count of 8. A 7-point Likert scale ranging from 1 to 7 is used to evaluate how often you play videogames and which types of videogames you prefer.								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**Grand Total**
Romania	14	13	14	9	11	10	13	84
Grand Total	**14**	**13**	**14**	**9**	**11**	**10**	**13**	**84**

As you can see in the table above, 40% of the respondents said that are interested in, 11% are neihter interested, nor disinterested and 49% are not interested. As you can see, the interest for this kind of game is likely low.

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**	**Grand Total**
Romania	16	12	19	11	10	7	9	84
Grand Total	**16**	**12**	**19**	**11**	**10**	**7**	**9**	**84**

As you can see in the table above, 31% of the respondents said that are interested in, 13% are neihter interested, nor disinterested and 56% are not interested. As you can see, the interest for this kind of game is likely low.

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	Grand Total
Romania	9	16	15	7	20	9	8	84
Grand Total	**9**	**16**	**15**	**7**	**20**	**9**	**8**	**84**
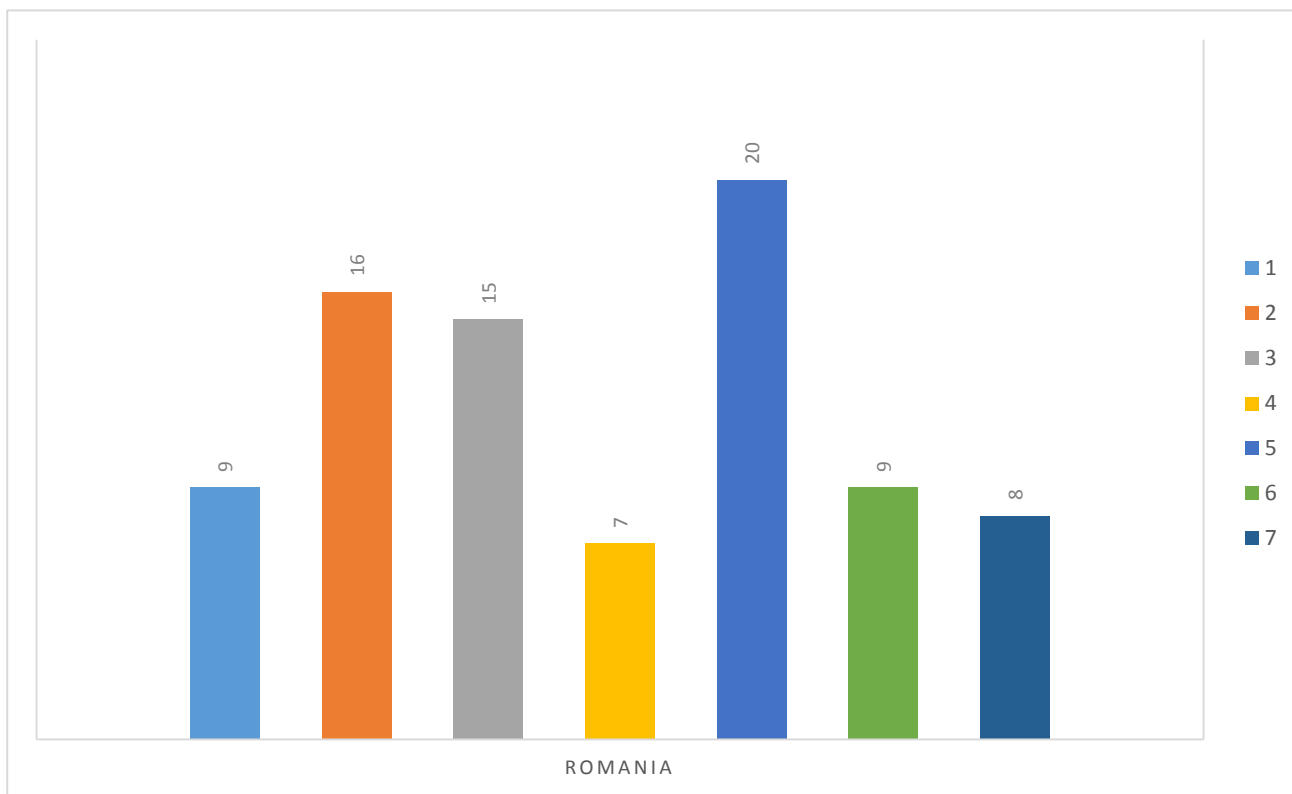
As you can see in the table above, 44% of the respondents said that are interested in, 8% are neihter interested, nor disinterested and 48% are not interested. As you can see, the interest for this kind of game is likely low.

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	Grand Total
Romania	6	11	26	27	14	84
Grand Total	**6**	**11**	**26**	**27**	**14**	**84**
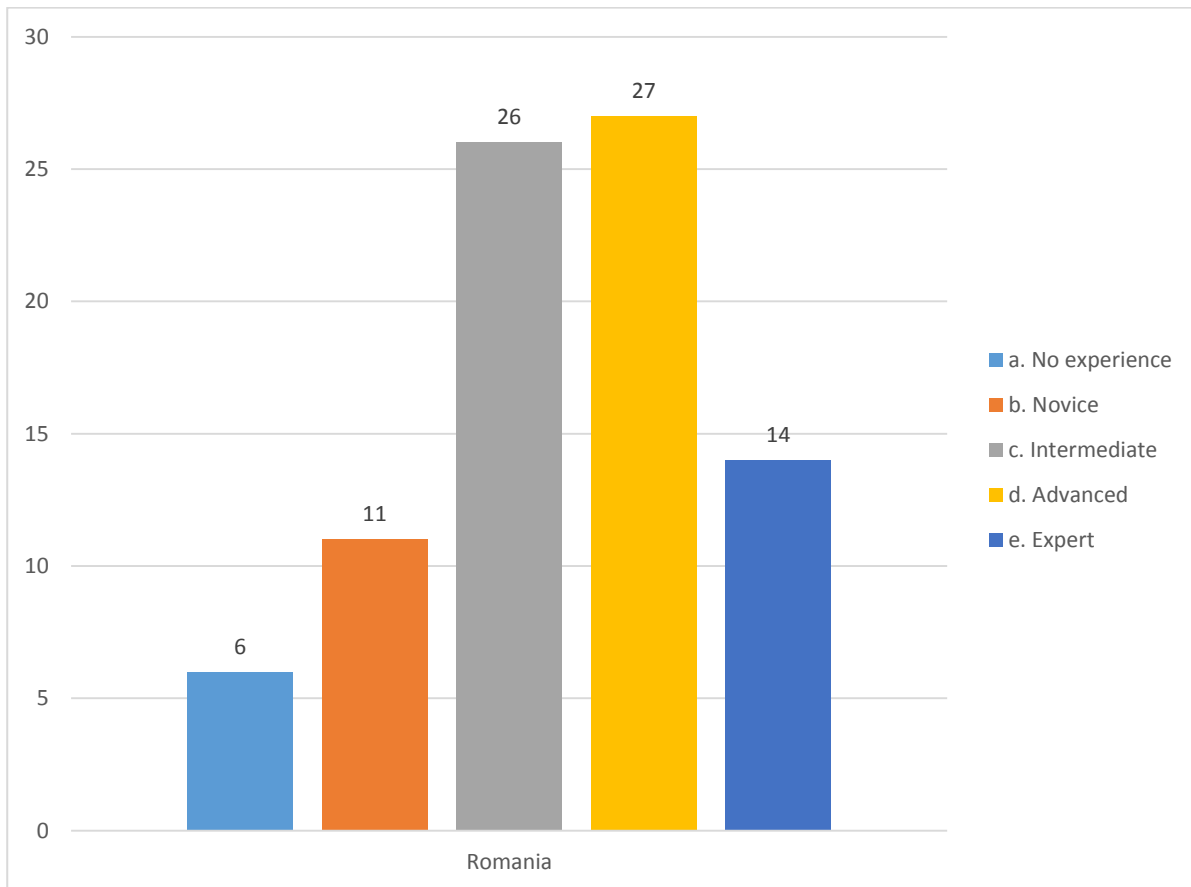
As can be seen from the previous table, 31% of respondents considered the experience with video games to be moderate, 49% rate it very high and 20% showed low interest in video games.

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	Grand Total
Romania	17	21	20	18	8	84
Grand Total	**17**	**21**	**20**	**18**	**8**	**84**
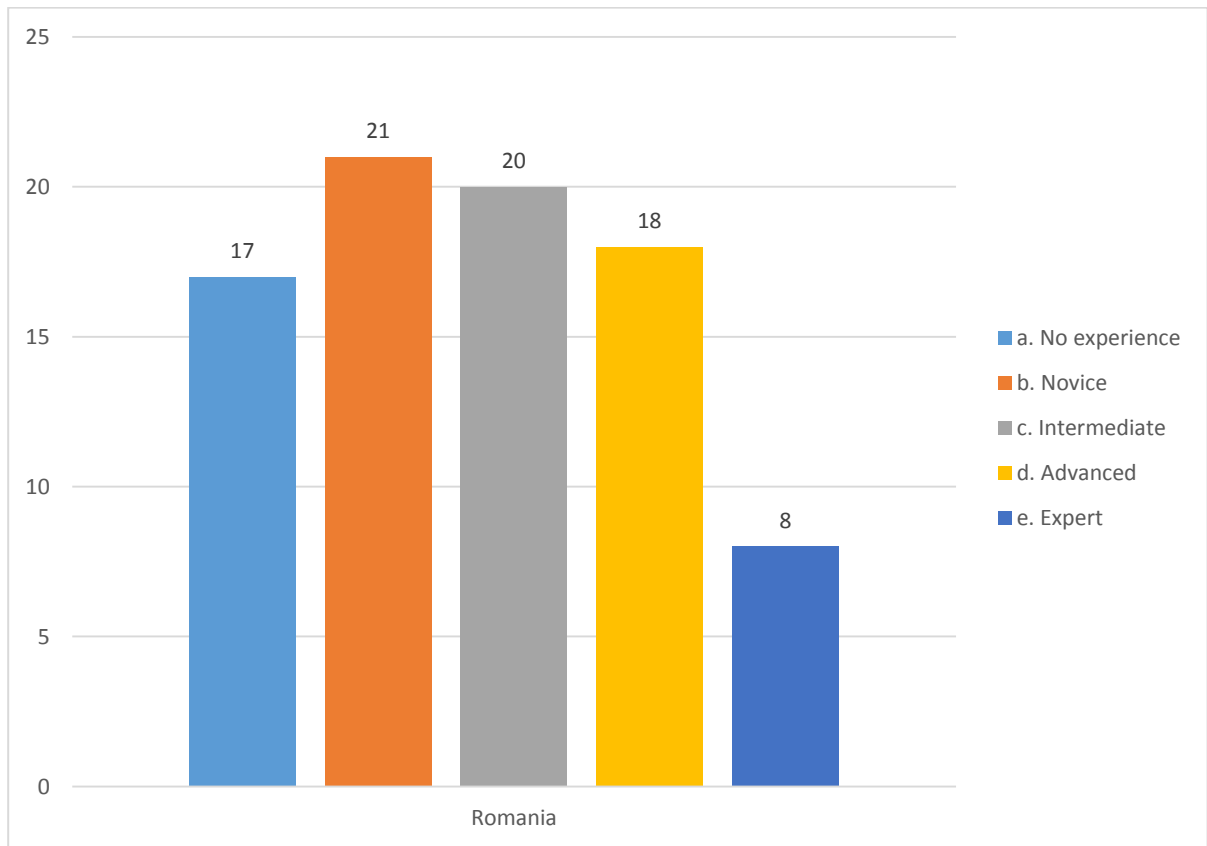
As can be seen from the previous table, 24% of respondents considered the experience with video games to be moderate, 31% rate it very high and 45% showed low interest in 3D games/environments.

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

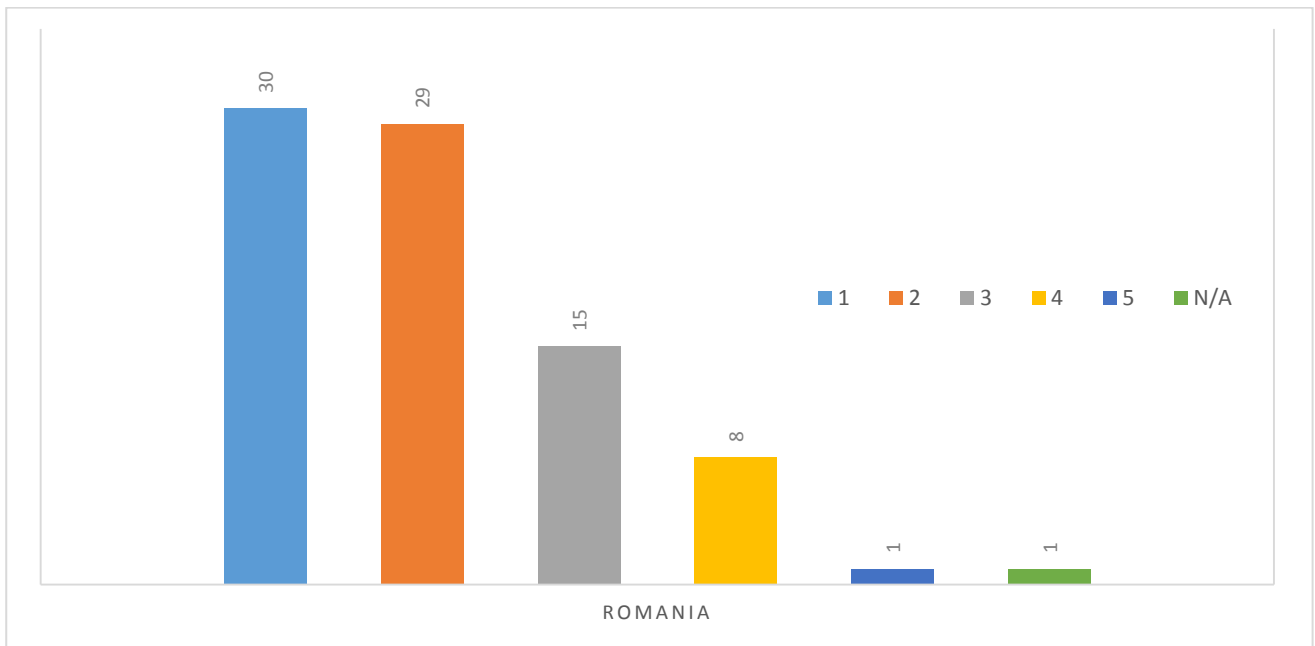| Count of 1. A 5-point Likert scale ranging from 1 to 5 is used to evaluate the users' subjective impressions regarding the system and their degrees of satisfaction.						
	1	**2**	**3**	**4**	**5**	**Grand Total**
Romania	4	5	27	35	13	84
Grand Total	**4**	**5**	**27**	**35**	**13**	**84**
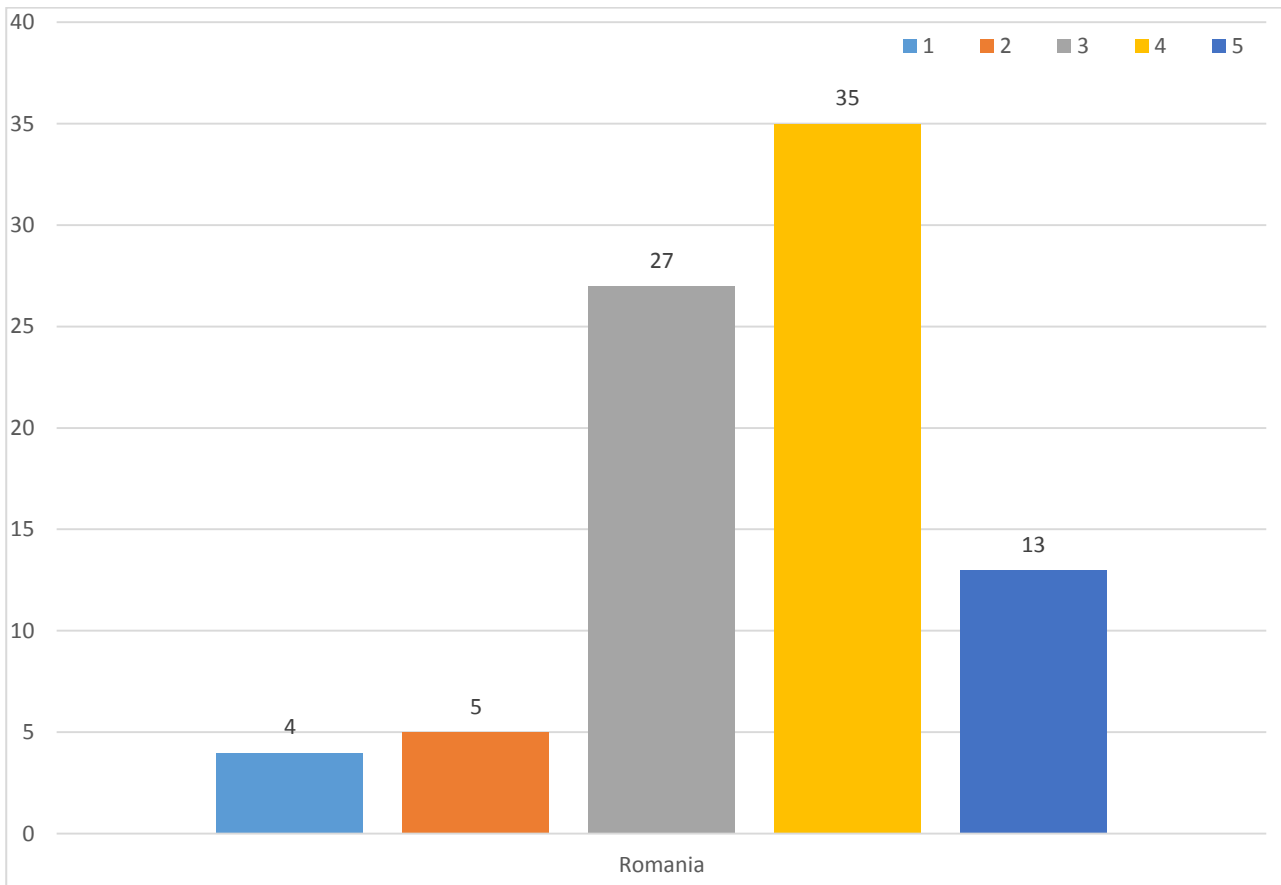
As can be seen from the previous table, 57% of respondents are more likely to use 3D world, 32% of them are neither interested, nor dinsinterested in using them and 11% showed low interest in 3D worlds.

b. I found the Virtual 3D World unnecessarily complex

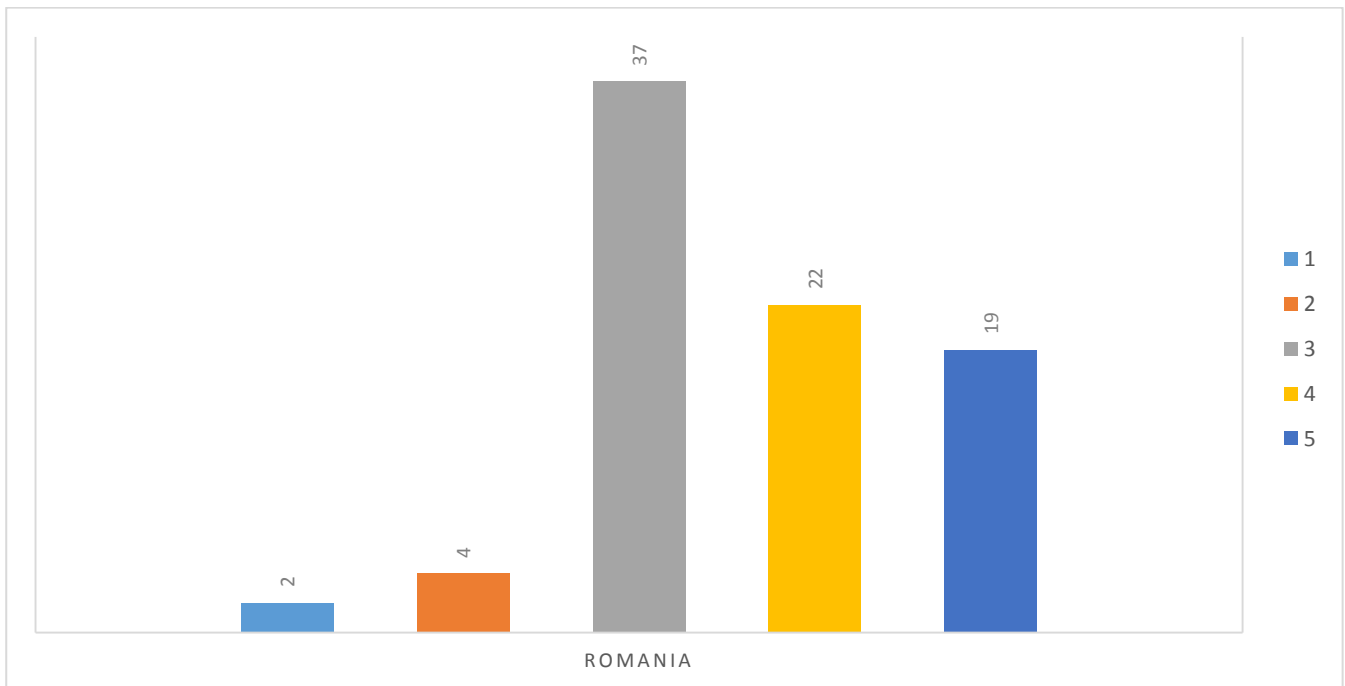| Count of 1. A 5-point Likert scale ranging from 1 to 5 is used to evaluate the users' subjective impressions regarding the system and their degrees of satisfaction.	1	2	3	4	5	N/A	Grand Total
Romania	30	29	15	8	1	1	84
Grand Total	**30**	**29**	**15**	**8**	**1**	**1**	**84**

As can be seen from the previous table, 70% of respondents considered that the virtual 3D world is not so unnecessarily complex, while only 11% considered it more complex than necessary.

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

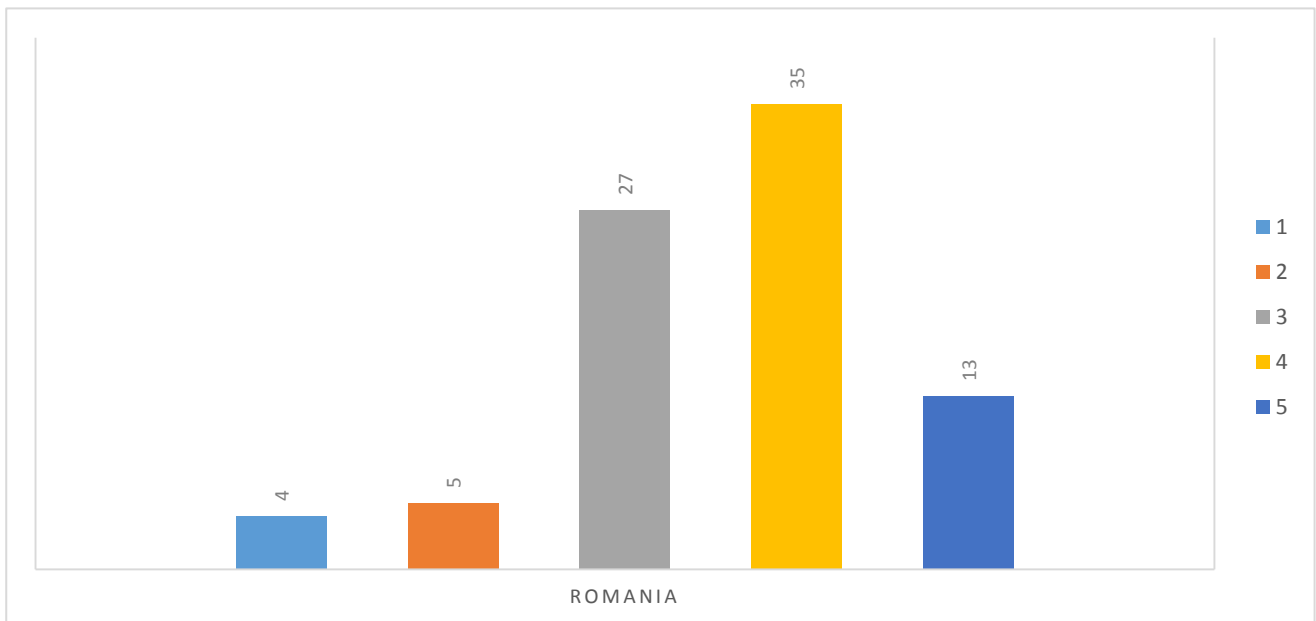| Count of 1. A 5-point Likert scale ranging from 1 to 5 is used to evaluate the users' subjective impressions regarding the system and their degrees of satisfaction.						
	1	**2**	**3**	**4**	**5**	**Grand Total**
Romania	2	4	37	22	19	84
Grand Total	**2**	**4**	**37**	**22**	**19**	**84**

As can be seen from the previous table, 49% of respondents said 3D virtual worlds were easy to use, while 44% considered it was neither difficult nor easy to use, and only 7% disagreed.

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

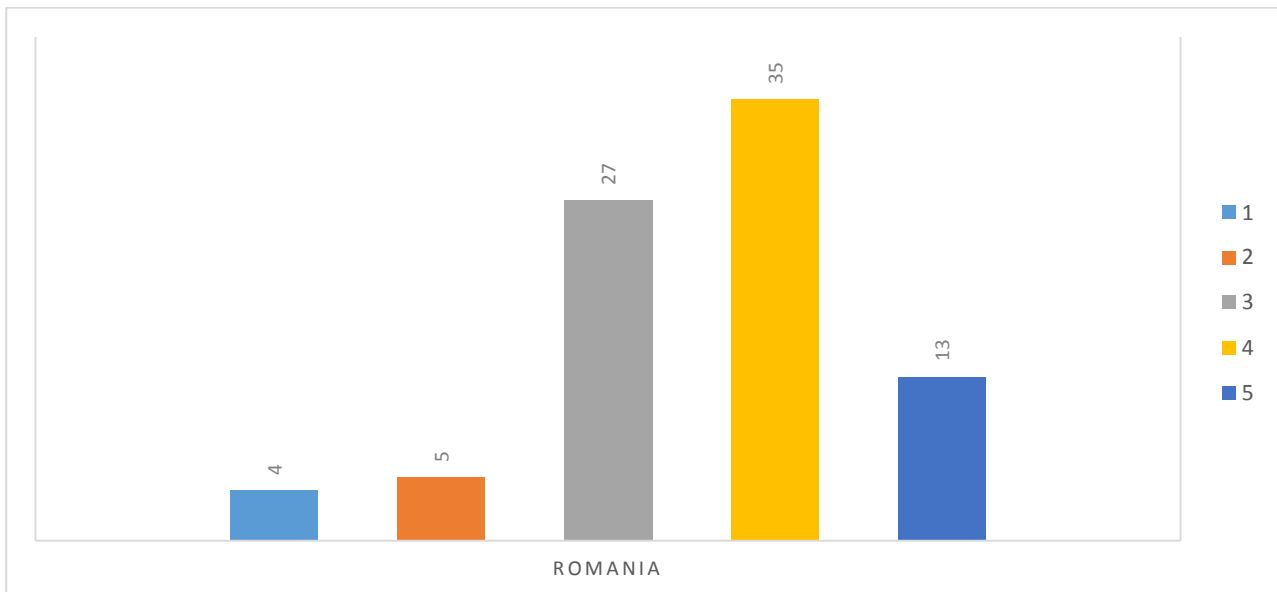| Count of 1. A 5-point Likert scale ranging from 1 to 5 is used to evaluate the users' subjective impressions regarding the system and their degrees of satisfaction.						
	1	**2**	**3**	**4**	**5**	**Grand Total**
Romania	4	5	27	35	13	84
Grand Total	**4**	**5**	**27**	**35**	**13**	**84**

As can be seen from the previous table, 11% of respondents felt they did not need technical support to use 3D virtual worlds, while 32% said they nor not feel the need for technical support, neither reject it, while 57% said they needed technical support.

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

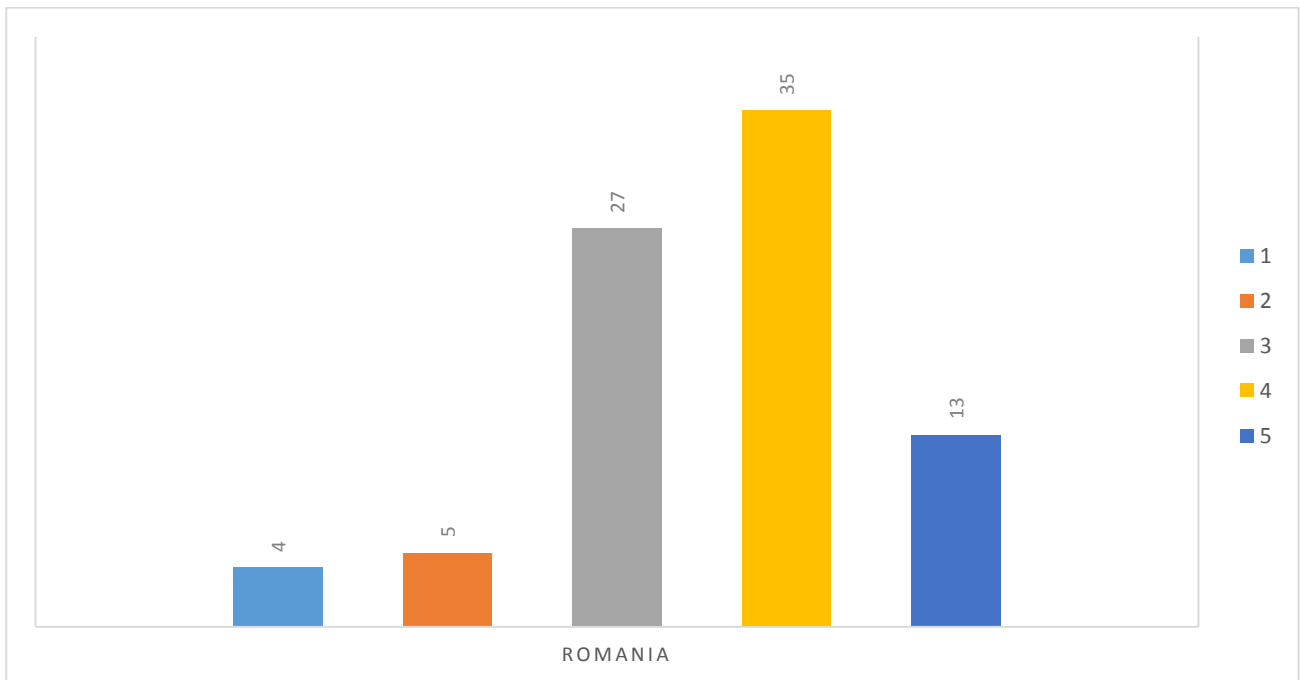| Count of 1. A 5-point Likert scale ranging from 1 to 5 is used to evaluate the users' subjective impressions regarding the system and their degrees of satisfaction.						
	1	2	3	4	5	Grand Total
Romania	4	5	27	35	13	84
Grand Total	**4**	**5**	**27**	**35**	**13**	**84**

57% of respondents said that different functionalities of the 3D virtual worlds were very well integrated, while 32% did not have a clear opinion in this respect and only 11% felt that they were not sufficiently integrated.

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

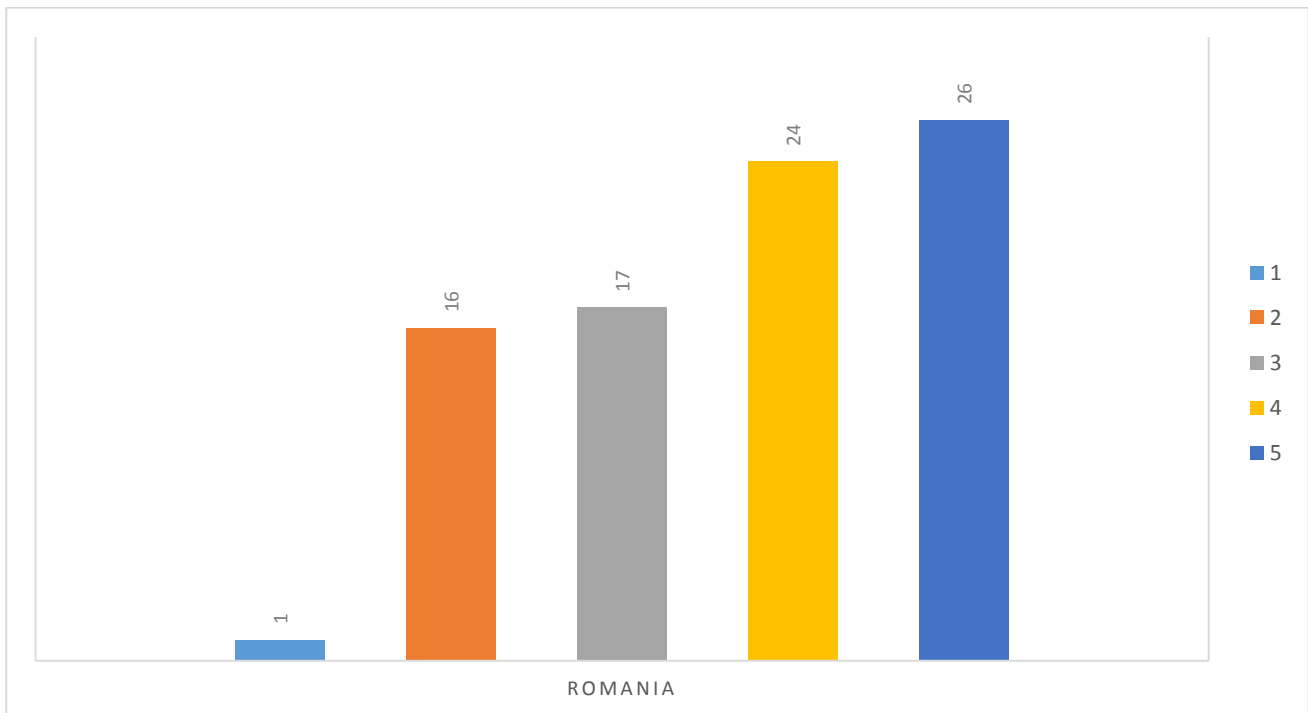| Count of 1. A 5-point Likert scale ranging from 1 to 5 is used to evaluate the users' subjective impressions regarding the system and their degrees of satisfaction.						
	1	**2**	**3**	**4**	**5**	**Grand Total**
Romania	4	5	27	35	13	84
Grand Total	**4**	**5**	**27**	**35**	**13**	**84**

As can be seen in the previous table, 11% of respondents responded negatively to the inconsistency of 3D virtual worlds, 32% said they did not see this, and only 57% thought they were inconsistent.

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

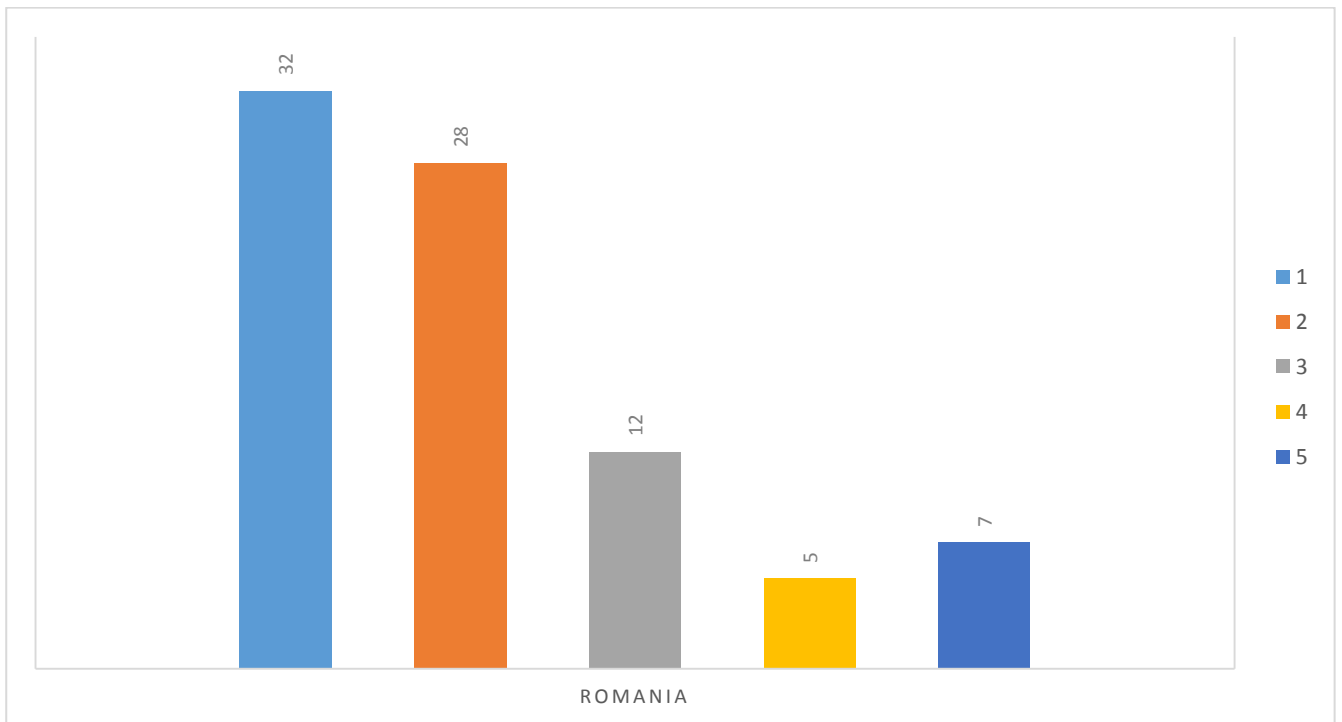| Count of 1. A 5-point Likert scale ranging from 1 to 5 is used to evaluate the users' subjective impressions regarding the system and their degrees of satisfaction.						
	1	**2**	**3**	**4**	**5**	**Grand Total**
Romania	1	16	17	24	26	84
Grand Total	**1**	**16**	**17**	**24**	**26**	**84**

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 20% consider you can not easily learn using the 3D virtual worlds.

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

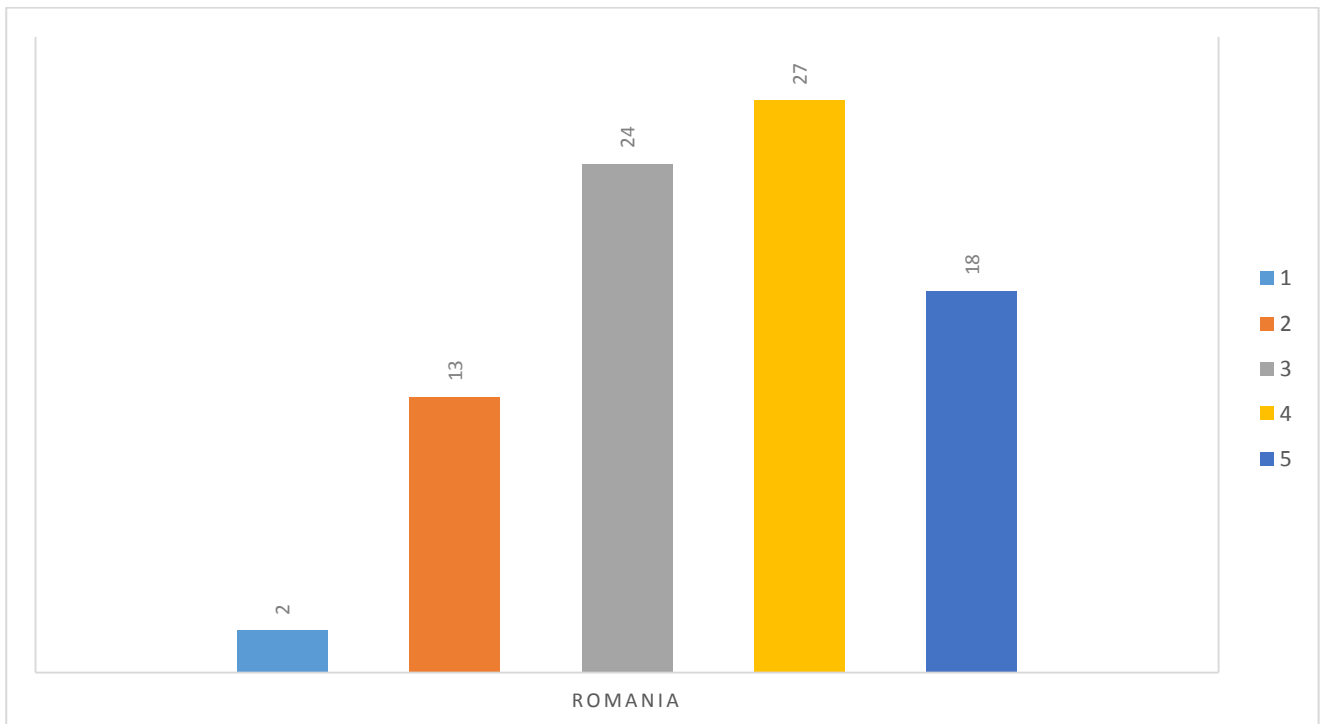| Count of 1. A 5-point Likert scale ranging from 1 to 5 is used to evaluate the users' subjective impressions regarding the system and their degrees of satisfaction.							
	1	**2**	**3**	**4**	**5**	**Grand Total**	
Romania	32	28	12	5	7		84
Grand Total	**32**	**28**	**12**	**5**	**7**		**84**

ROMANIA

As can be seen from the previous table, 71% of respondents do not find it difficult to use 3D virtual worlds, while 14% think it is neither difficult nor easy, and 15% think it is difficult to 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**	**Grand Total**
Romania	2	13	24	27	18	84
Grand Total	**2**	**13**	**24**	**27**	**18**	**84**

As can be seen from the previous table, 54% of respondents consider themselves confident when using 3D virtual worlds and only 18% did not feel confident.

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

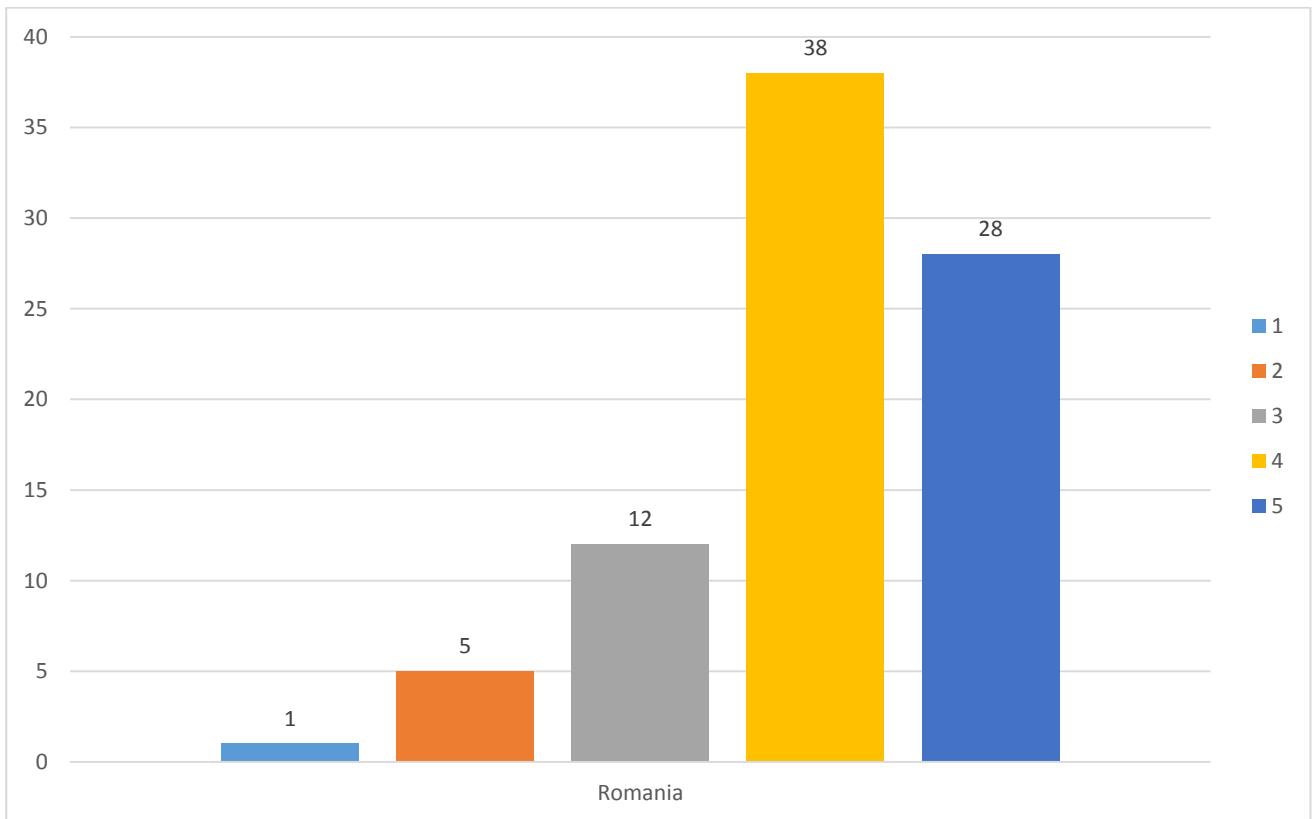| Count of 1. A 5-point Likert scale ranging from 1 to 5 is used to evaluate the users' subjective impressions regarding the system and their degrees of satisfaction.						
	1	**2**	**3**	**4**	**5**	**Grand Total**
Romania	21	29	16	13	5	84
Grand Total	**21**	**29**	**16**	**13**	**5**	**84**
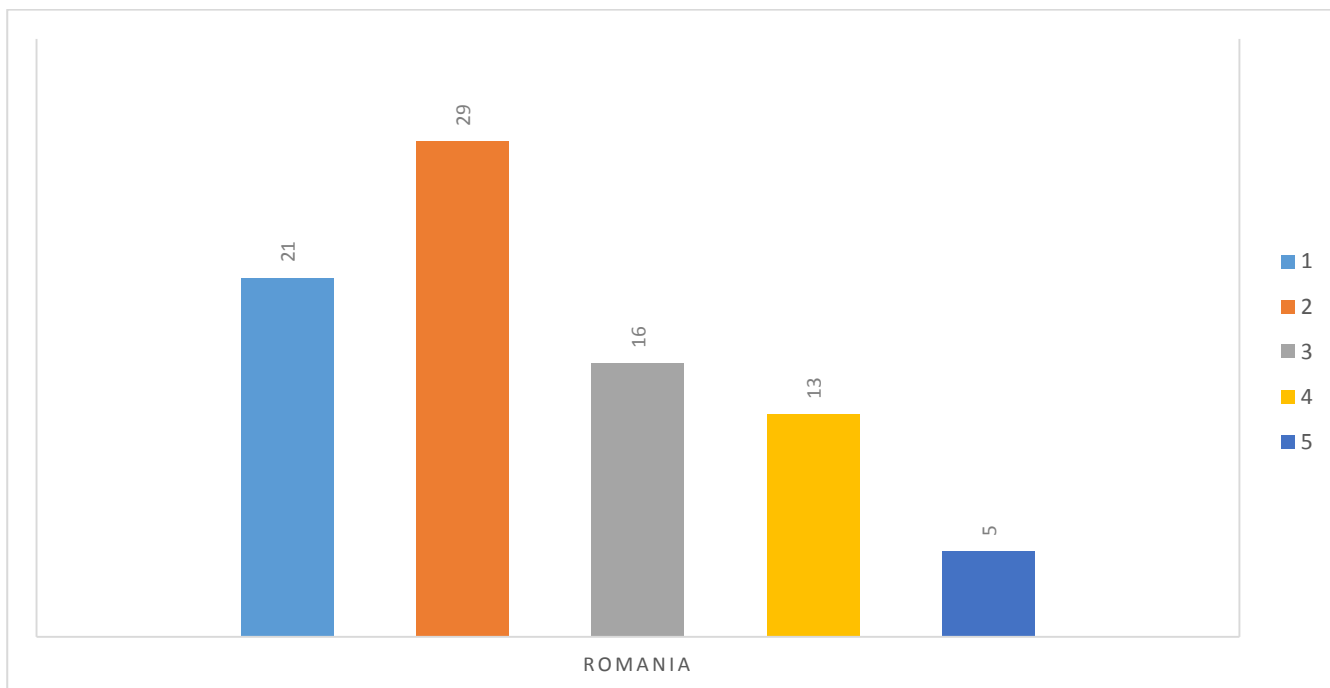
As can be seen from the previous table, 60% of respondents considered enough information to be able to go through the exercises in the virtual worlds, while 21% felt that they needed to learn a few things to go through the tests.

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

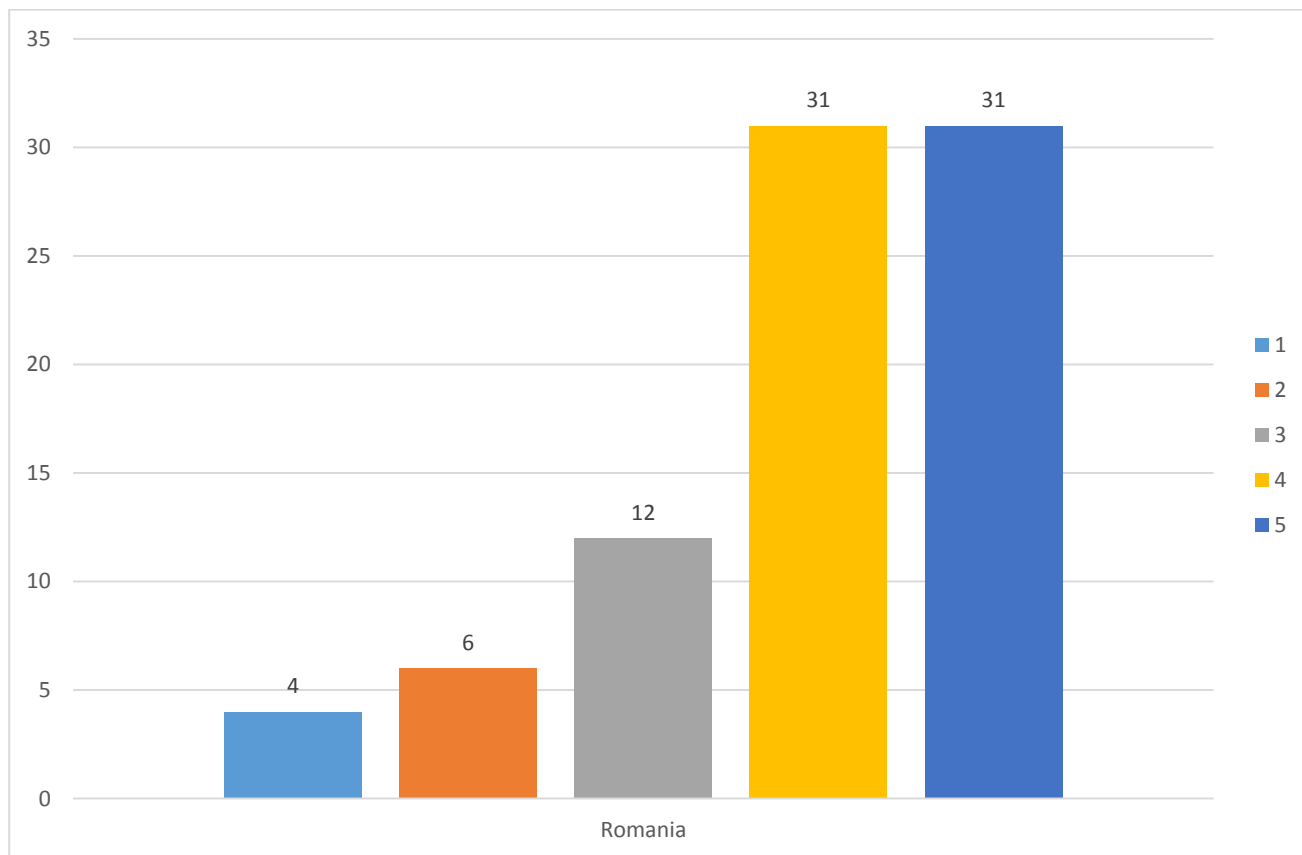| Count of 2. Please tick the box that best represents how you feel about the 3D virtual environment as a learning tool to study Physics [a. Comfort using this learning tool]	1	2	3	4	5	Grand Total
Romania	1	5	12	38	28	84
Grand Total	**1**	**5**	**12**	**38**	**28**	**84**

Regarding the convenience of using virtual 3D worlds as a learning method, 79% of respondents said they felt comfortable, while 7% said they did not feel comfortable.

b. Impact on learning performance

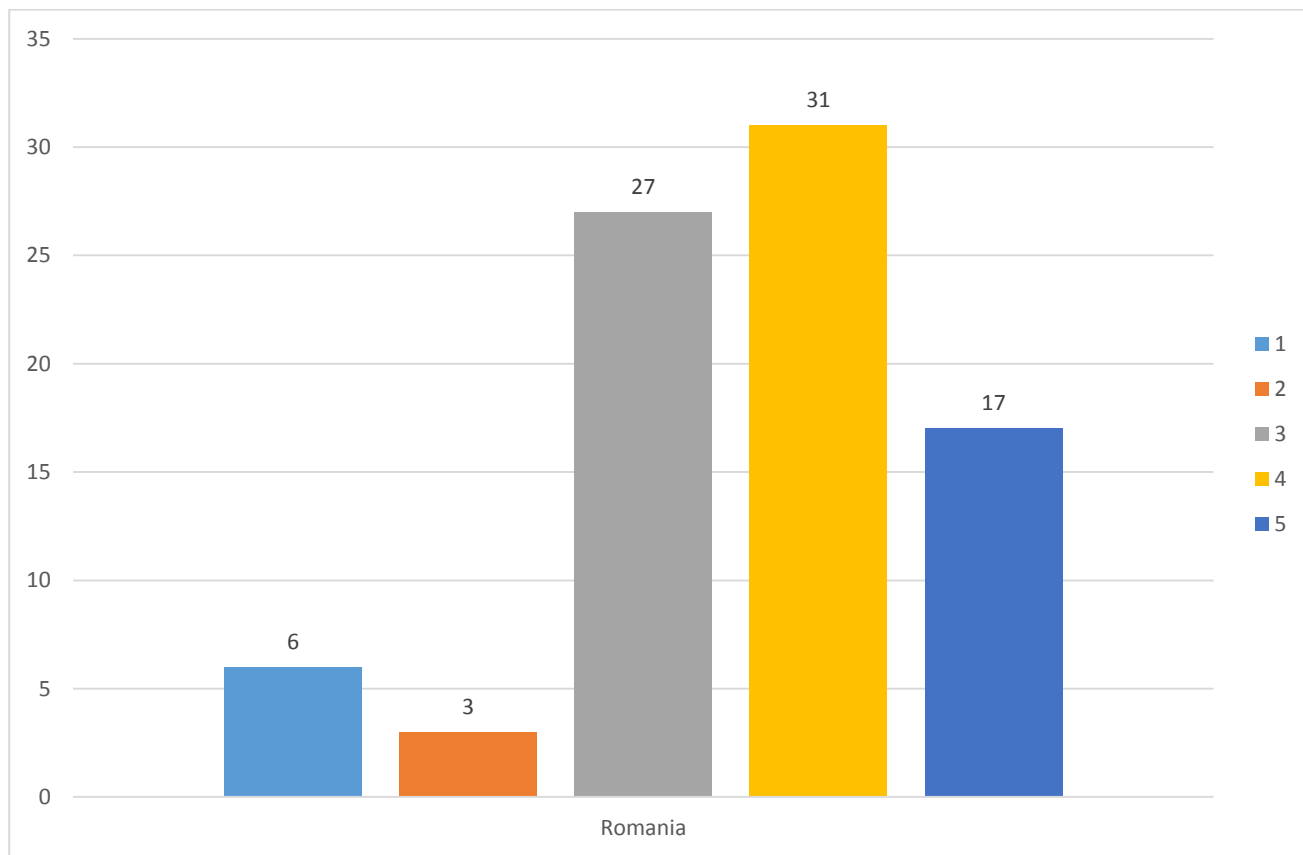| Count of 2. Please tick the box that best represents how you feel about the 3D virtual environment as a learning tool to study Physics [b. Impact on learning performance]						
	1	2	3	4	5	Grand Total
Romania	4	6	12	31	31	84
Grand Total	4	6	12	31	31	84

In terms of impact on learning performance, 74% agreed with the high impact of 3D virtual worlds in the learning process, while only 12% disapproved of their impact.

c. Knowledge improvement on the Physics topic of the scenario

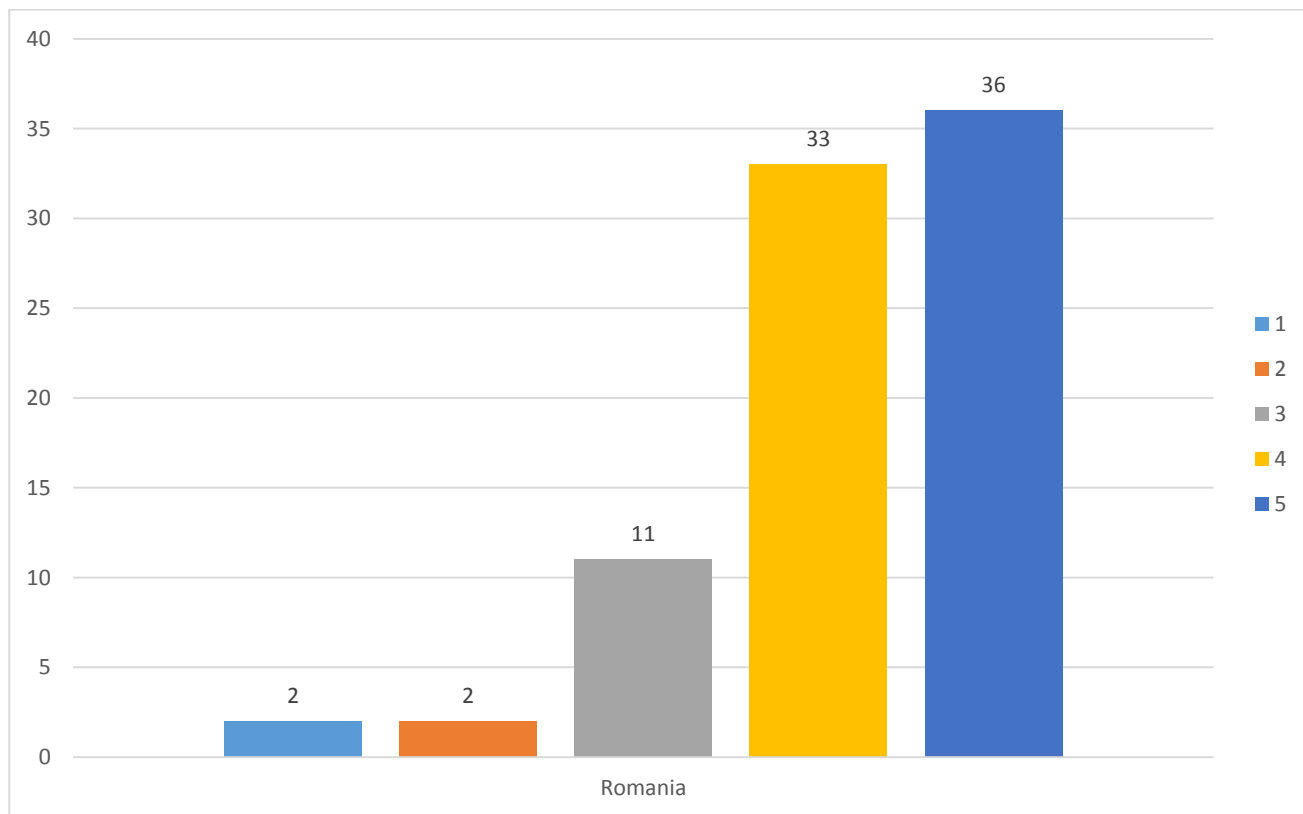| Count of 2. Please tick the box that best represents how you feel about the 3D virtual environment as a learning tool to study Physics [c. Knowledge improvement on the Physics topic of the scenario]	1	2	3	4	5	Grand Total
Romania	6	3	27	31	17	84
Grand Total	**6**	**3**	**27**	**31**	**17**	**84**

As can be seen from the previous table, 57% considered Physics study through 3D virtual worlds to be a good experience, while only 11% felt they did not help this type of learning.

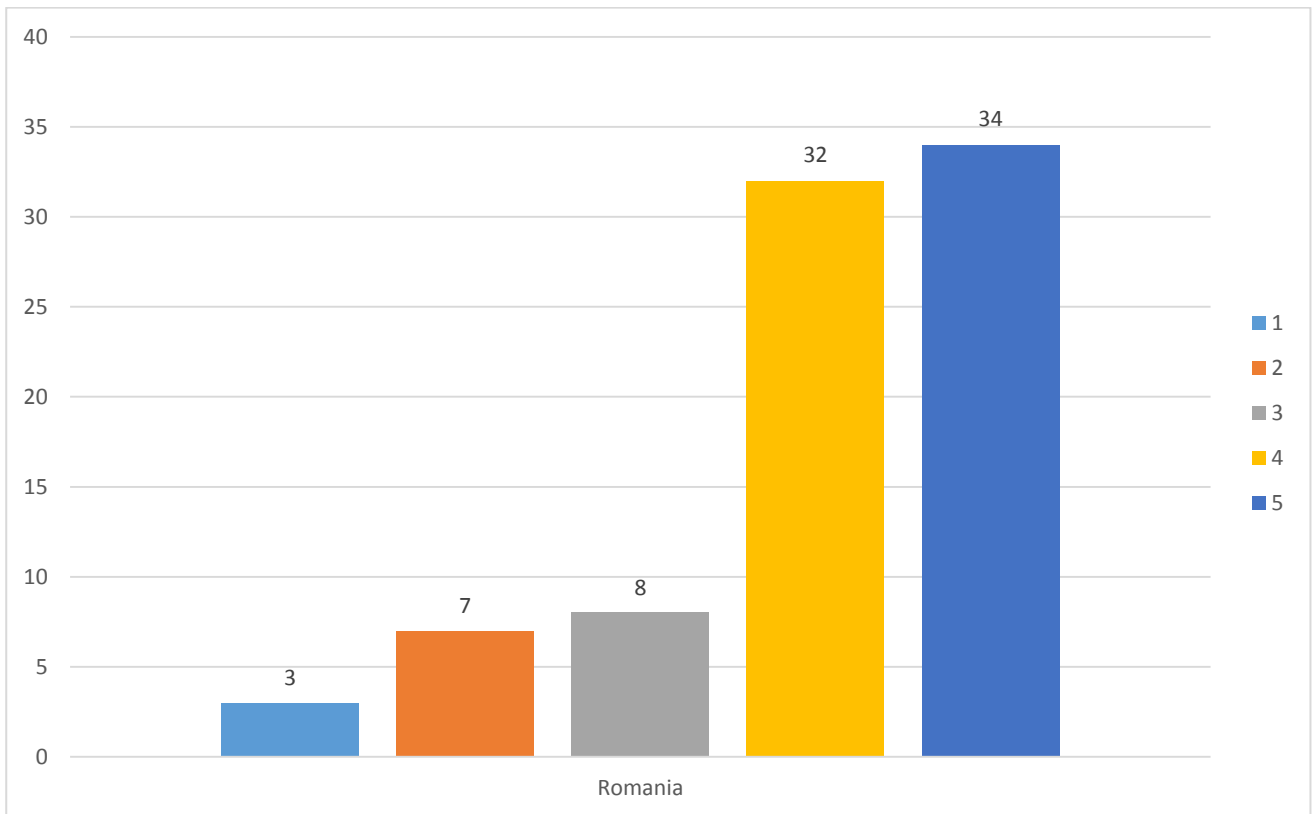**d. Recommend this learning tool to a friend**

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	Grand Total
Romania	2	2	11	33	36	84
Grand Total	**2**	**2**	**11**	**33**	**36**	**84**

As can be seen from the previous table, 82% of respondents think they will recommend 3D virtual worlds to other friends to study Physics, while only 5% will not recommend virtual worlds.

e. Learning experience offered

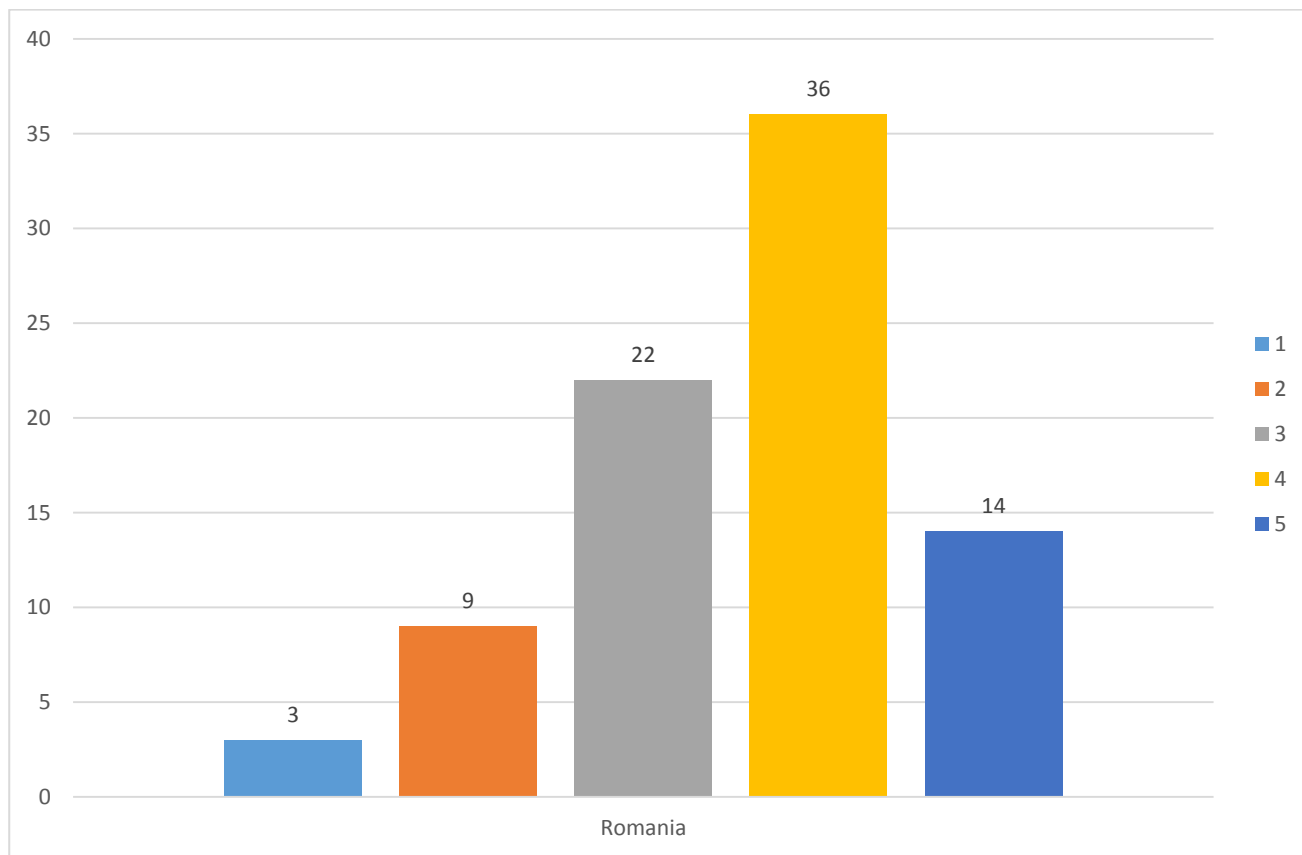| Count of 2. Please tick the box that best represents how you feel about the 3D virtual environment as a learning tool to study Physics [e. Learning experience offered]						
	1	**2**	**3**	**4**	**5**	**Grand Total**
Romania	3	7	8	32	34	84
Grand Total	**3**	**7**	**8**	**32**	**34**	**84**

Regarding the learning experience of 3D virtual worlds, 79% of respondents said it was positive, while only 12% considered it to be a negative experience.

f. Increase chances of performing better in the Physics class

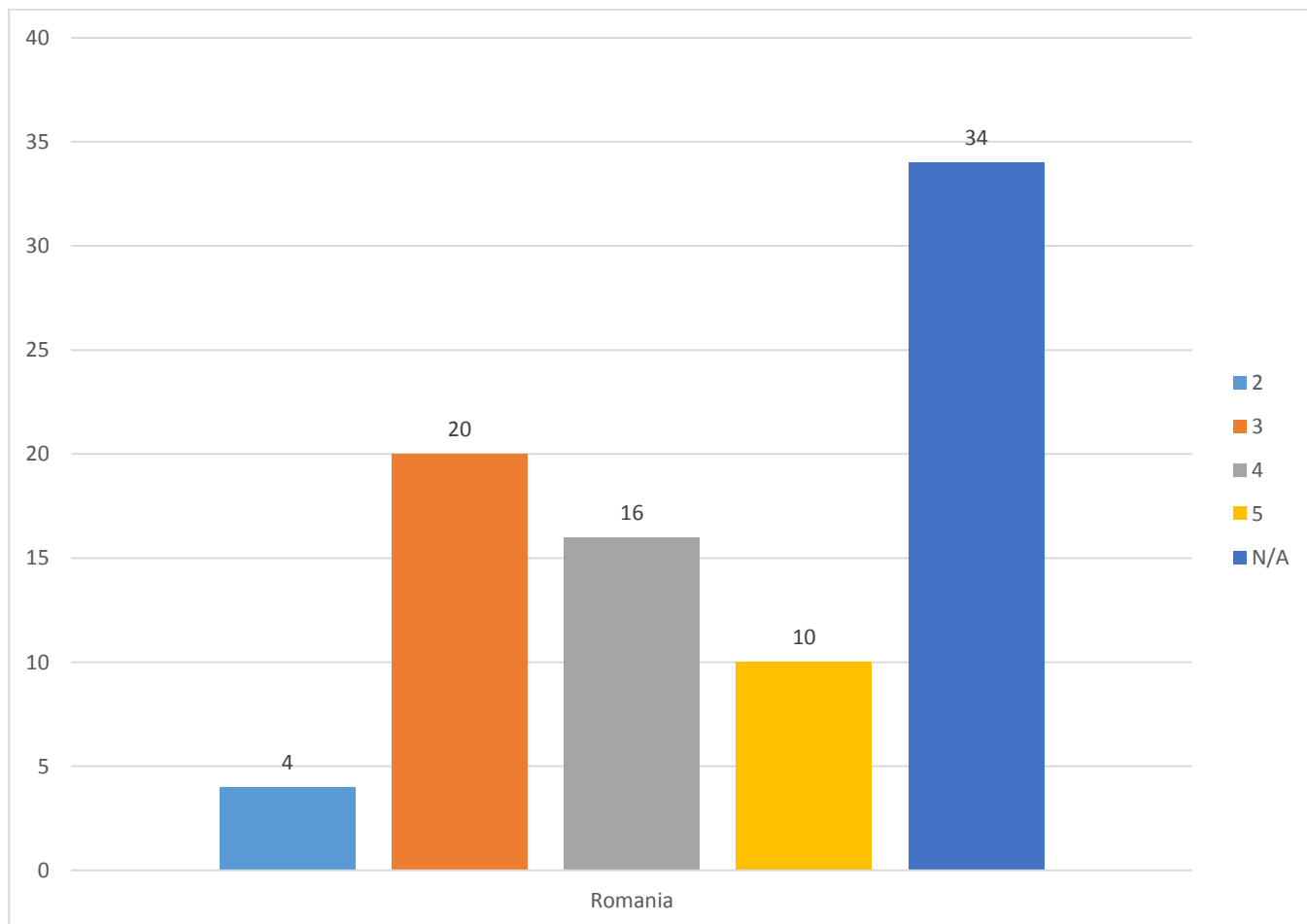| Count of 2. Please tick the box that best represents how you feel about the 3D virtual environment as a learning tool to study Physics [f. Increase chances of performing better in the Physics class]						
	1	**2**	**3**	**4**	**5**	**Grand Total**
Romania	3	9	22	36	14	84
Grand Total	**3**	**9**	**22**	**36**	**14**	**84**

As can be seen from the previous table, 60% of respondents believe that virtual worlds significantly increase their chances of improving Physics performance, while 14% believe that the impact of virtual worlds on performance enhancement in Physics study is low.
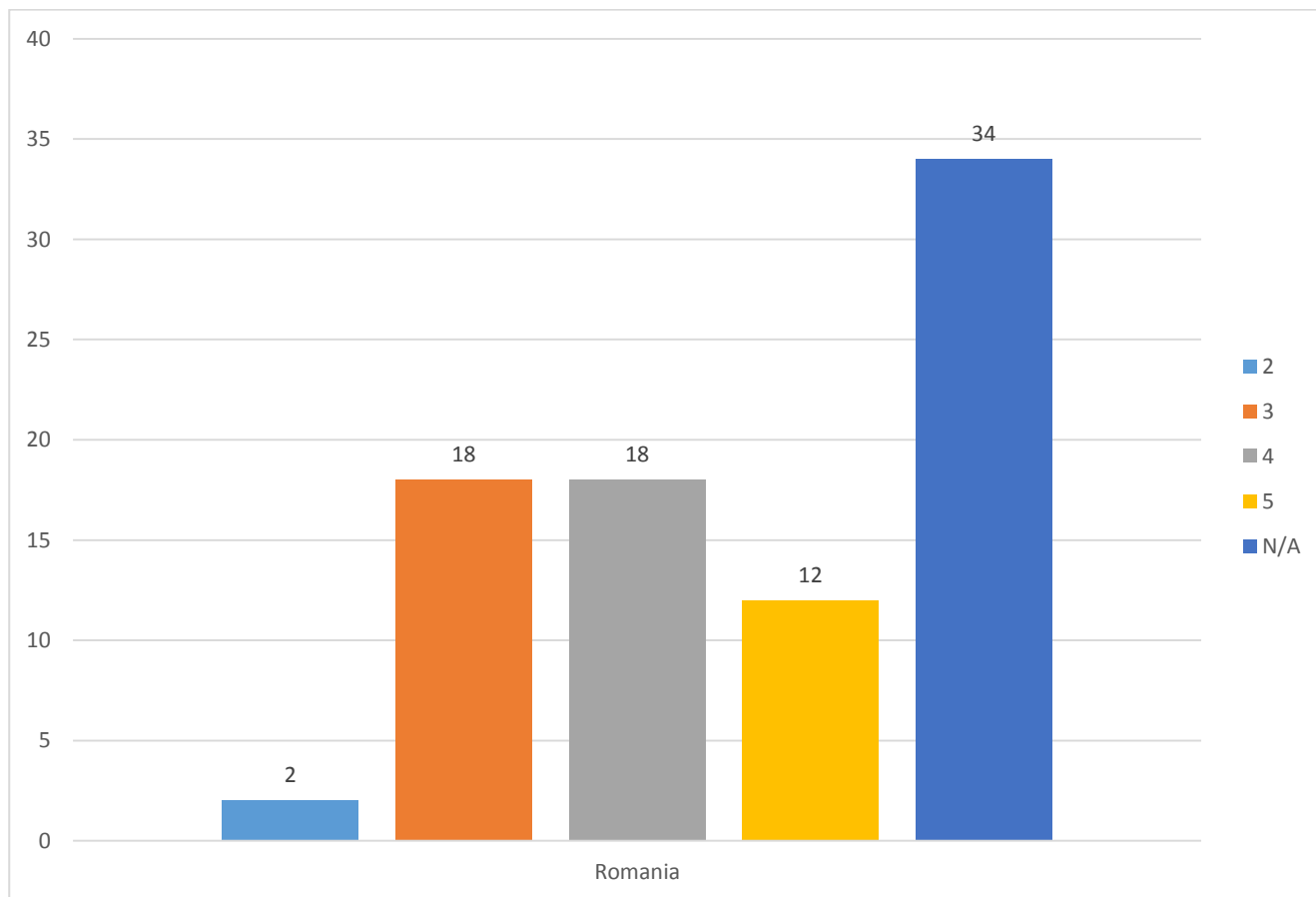
g. Change the opinion for the Physics topic

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]						
	2	**3**	**4**	**5**	**N/A**	**Grand Total**
Romania	4	20	16	10	34	84
Grand Total	**4**	**20**	**16**	**10**	**34**	**84**

Regarding the change of opinion on the topics approached, 52% of the respondents consider that the 3D virtual worlds have changed their opinion on the subjects of physics approached, 19% considered that they did not influence them in anyway, and 29% felt that it was not appropriate to answer this question.

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]						
	2	**3**	**4**	**5**	**N/A**	**Grand Total**
Romania	2	18	18	12	34	84
Grand Total	**2**	**18**	**18**	**12**	**34**	**84**

As can be seen from the previous table, 36% of respondents considered that their interest in the study of physics increased after using 3D virtual worlds, while only 2% said their interest did not increase.

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]							
	2	**3**	**4**	**5**	**N/A**	**Grand Total**	
Romania	5	19	19	7	34		84
Grand Total	**5**	**19**	**19**	**7**	**34**		**84**
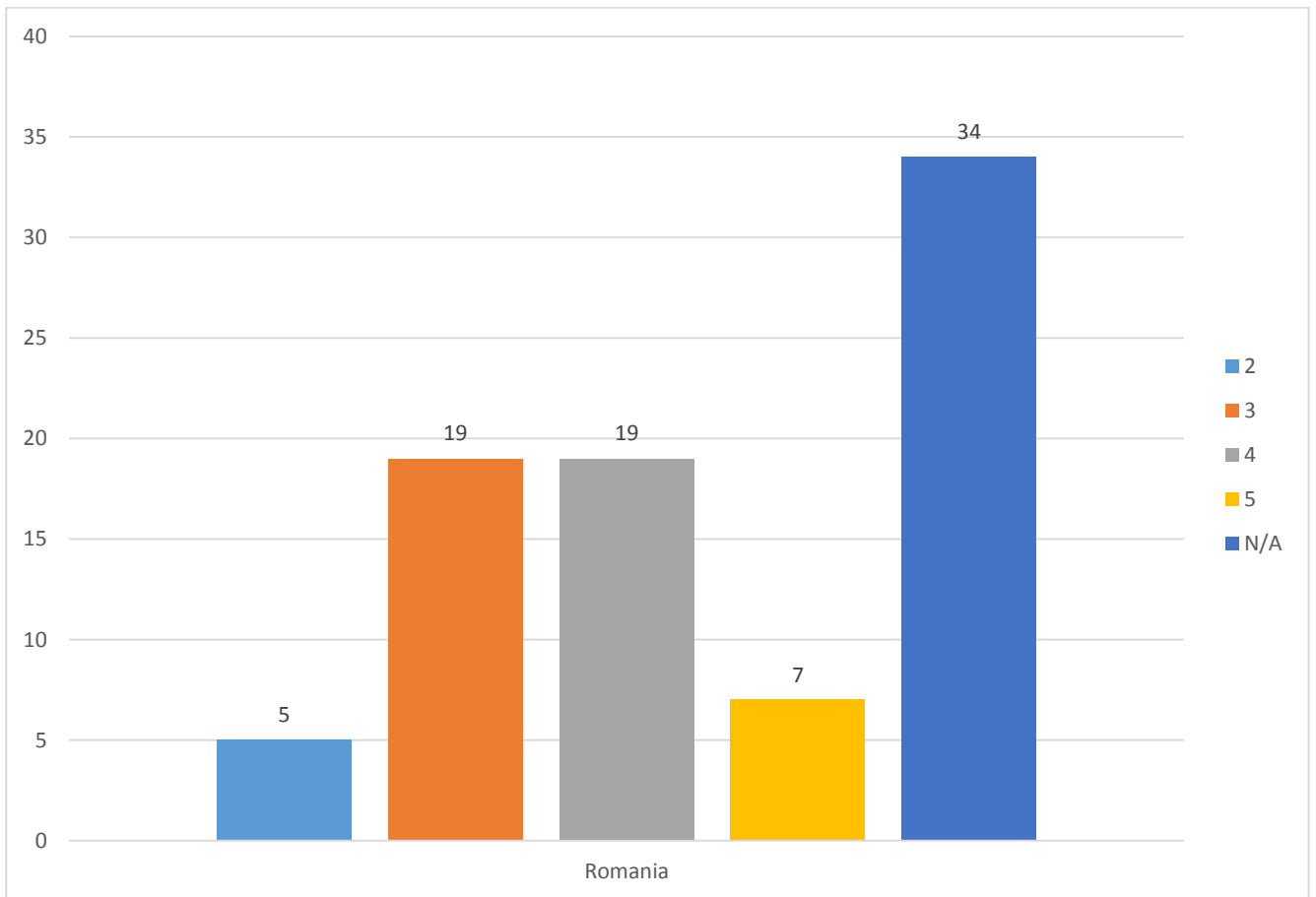
In terms of motivation for the study of physics, 31% of respondents said that the virtual worlds have increased their motivation, 40% of respondents did not want to answer this question, while 5% considered that the 3D virtual worlds have in no way influenced the motivation to study physics.