



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 Italy.
Authors (per company, if more than one company provide it together)	CTE, New Edu, UCY, CNR
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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

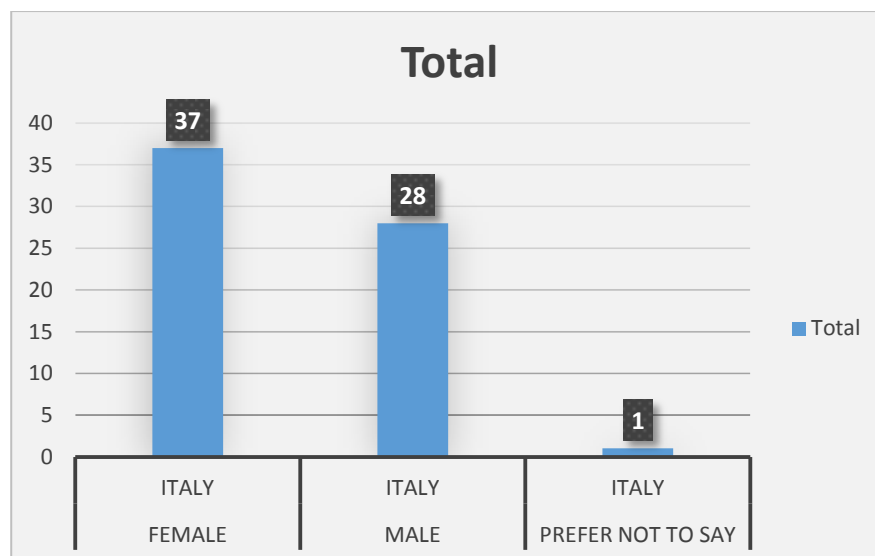
The current document contains the analysis of the results from the questionnaires that have been developed under the Project “WORLD OF PHYSICS LEARN / PLAY / HAVE FUN!” (ERASMUS + 2016-1-CY01-KA201-017371) in Italy. It contains the statistical analysis of the answers to questions addressed in questionnaires that were distributed to the participants to the piloting activities conducted in the project (total number of respondents is 66, approximate 19% 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:

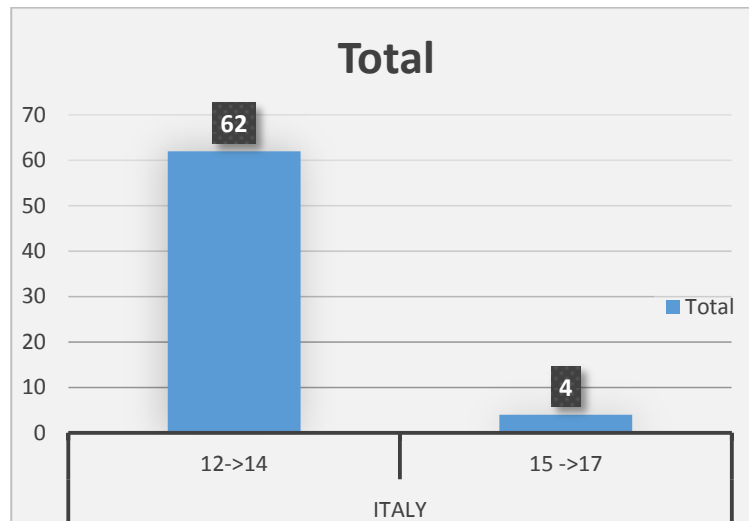
Count of 1. Gender:	
Female	37
Italy	37
Male	28
Italy	28
Prefer not to say	1
Italy	1
Grand Total	66



As can be seen from the above data, of the total number of respondents, 56% are women and 42% are men, the questionnaire being applied equally between the sexes. 2% of the respondents preferred not to answer to this question.

2. Age Group:

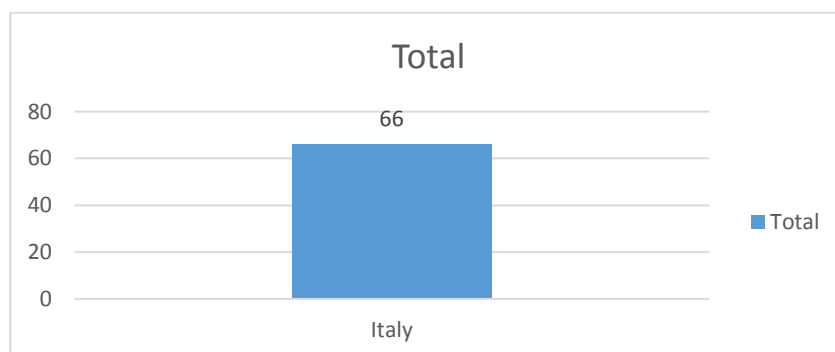
Count of 4. Rate from 1 to 7 how much you like Physics:	
Italy	66
12->14	62
15 ->17	4
Grand Total	66



At the level of the project, it can be seen that in Italy piloting was performed on two age groups (12-> 14; 15 -> 17), the age group with the highest rate of response being 12-> 14 years group (94%).

3. Participants per Country:

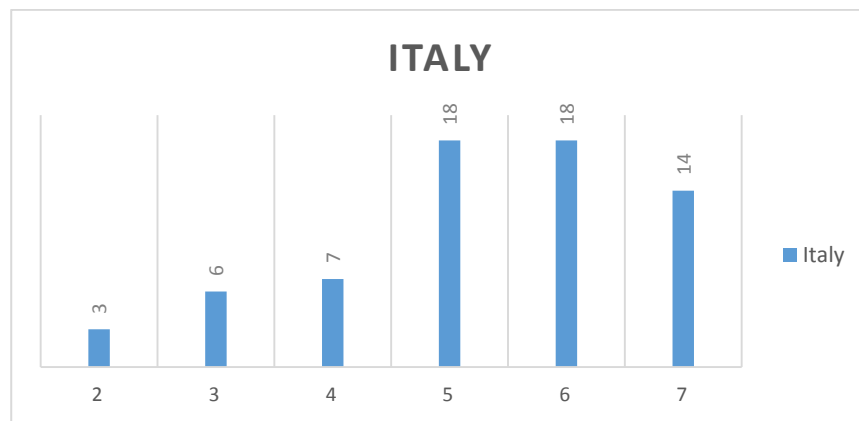
Count of 3. Country:	
Italy	66
Grand Total	66



The total number of respondents is 66, approximate 19% from all the respondents at the project level.

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

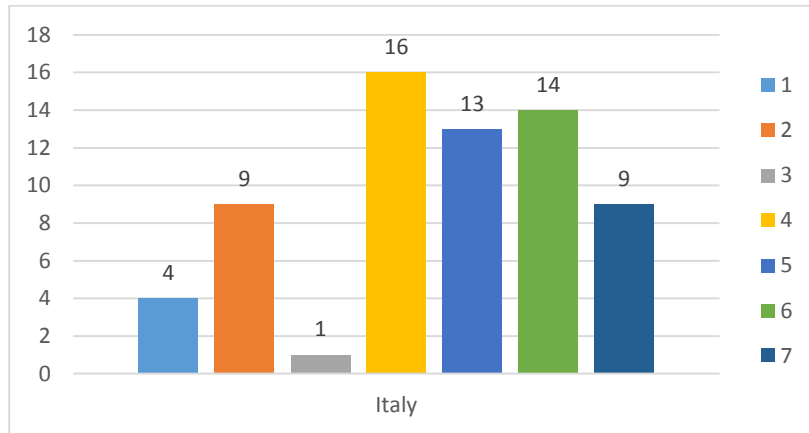
Count of 4. Rate from 1 to 7 how much you like Physics:			
	Italy	Grand Total	
2		3	3
3		6	6
4		7	7
5		18	18
6		18	18
7		14	14
Grand Total		66	66



Most of the respondents (76%) said they like to study physics, and only 11% 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:

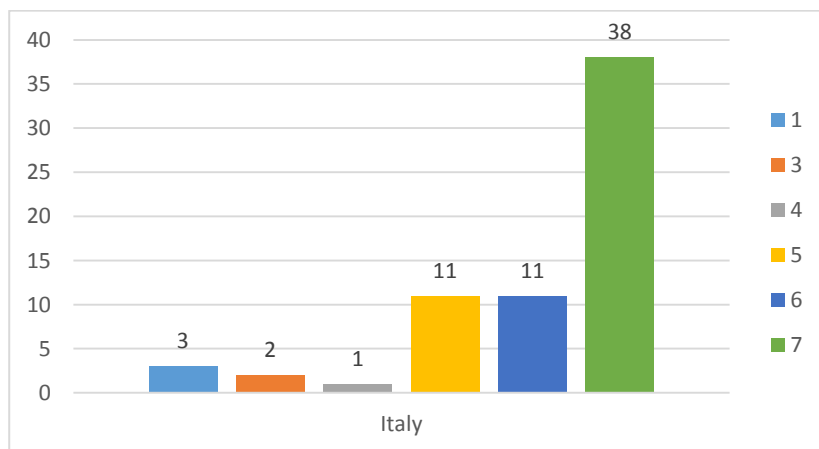
Count of 5. Rate from 1 to 7 how much you'd like to attend/participate in a physics event or competition:								
	1	2	3	4	5	6	7	Grand Total
Italy	4	9	1	16	13	14	9	66
Grand Total	4	9	1	16	13	14	9	66



55% of the total number of respondents show increased interest in attending physics events or competitions, while 24% don't know exactly if they want to participate in events and 21% 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:							
	1	3	4	5	6	7	Grand Total
Italy	3	2	1	11	11	38	66
Grand Total	3	2	1	11	11	38	66

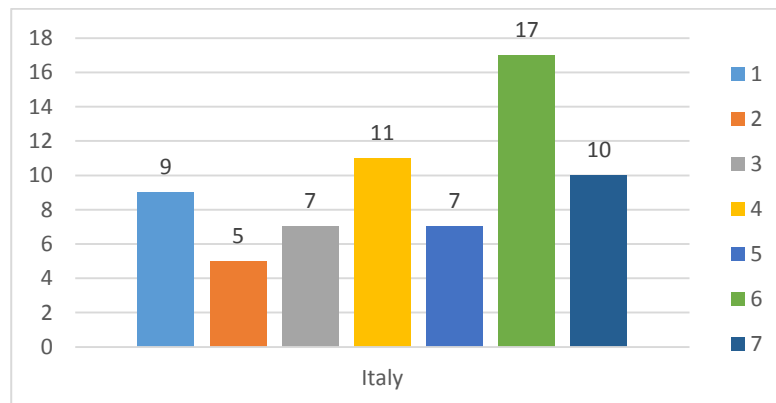


Of the total of respondents, 91% were excited to attend the event, 8% showed moderate interest and only 1% showed total disinterest.

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

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

	1	2	3	4	5	6	7	Grand Total
Italy	9	5	7	11	7	17	10	66
Grand Total	9	5	7	11	7	17	10	66



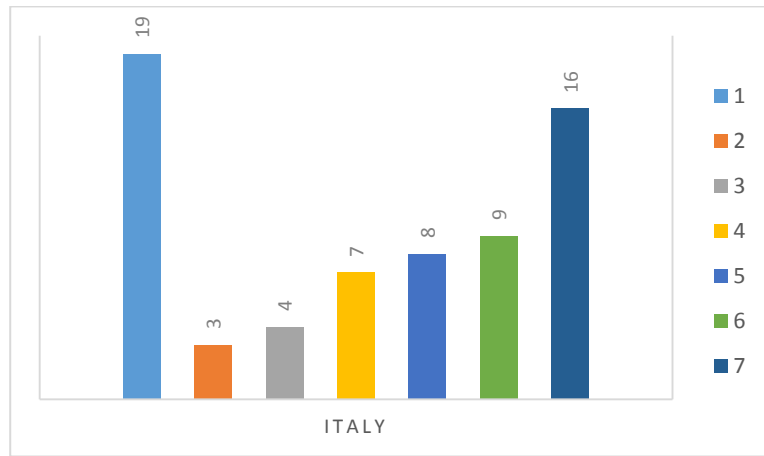
As can be seen from the above table, 52% of the total respondents have shown an increased interest in attending the annual Physics Olympics, 16% said they are indifferent, but they do not particularly want to participate and 32% of them showed low interest.

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
Italy	19	3	4	7	8	9	16	66
Grand Total	19	3	4	7	8	9	16	66

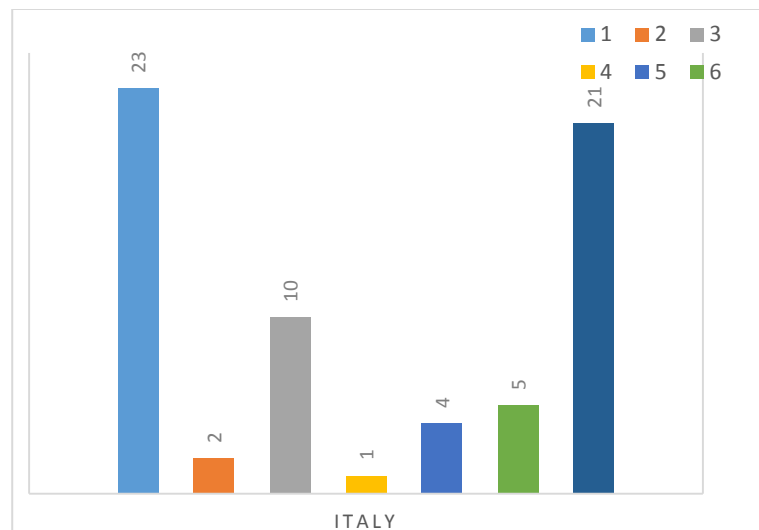


In Italy there is a greater openness to use video games, 50% of respondents showed high interest in playing video games, 11% of them showed moderate interest and 39% showed low interest.

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
Italy	23	2	10	1	4	5	21	66
Grand Total	23	2	10	1	4	5	21	66

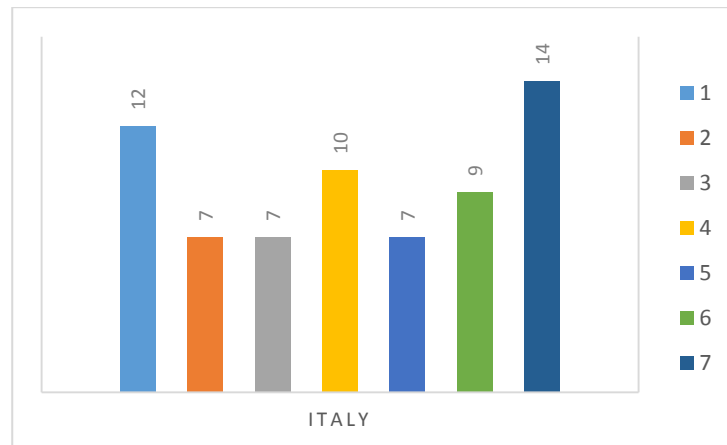


In terms of interest in this type of games, 45% of the respondents said that are interested in, 2% neither interested, nor disinterested and 53% are not interested.

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
Italy	12	7	7	10	7	9	14	66
Grand Total	12	7	7	10	7	9	14	66

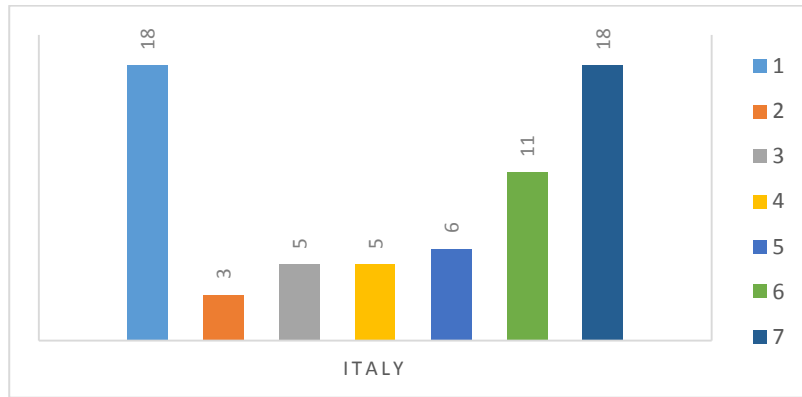


In terms of interest in this type of games, 45% of the respondents said that are interested in, 15% neither interested, nor disinterested and 40% are not interested.

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
Italy	18	3	5	5	6	11	18	66
Grand Total	18	3	5	5	6	11	18	66

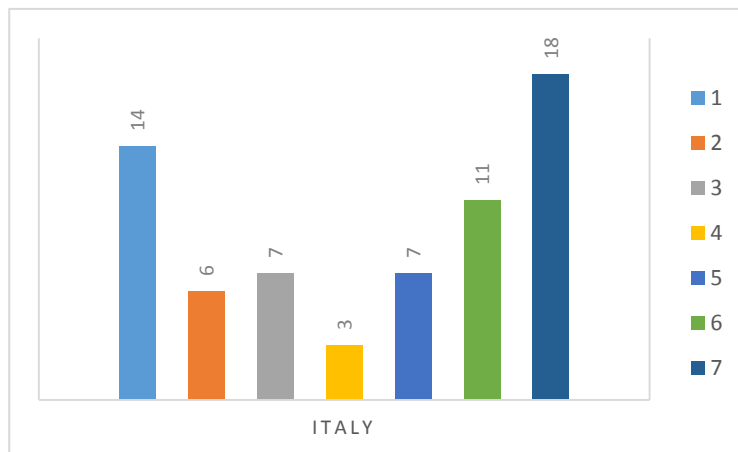


As you can see in the table above, 53% of the respondents said that are interested in, 8% neihter interested, nor disinterested and 39% are not interested.

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
Italy	14	6	7	3	7	11	18	66
Grand Total	14	6	7	3	7	11	18	66

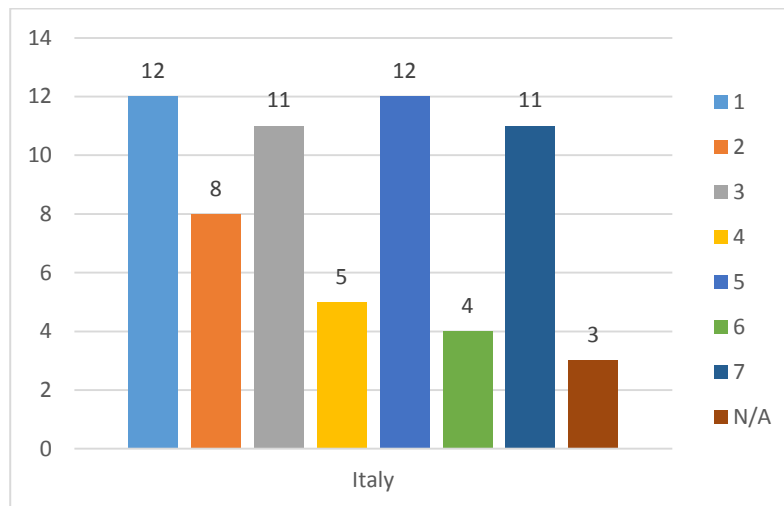


As you can see in the table above, 55% of the respondents said that are interested in, 5% neihter interested, nor disinterested and 40% are not interested.

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
Italy	12	8	11	5	12	4	11	3	66
Grand Total	12	8	11	5	12	4	11	3	66

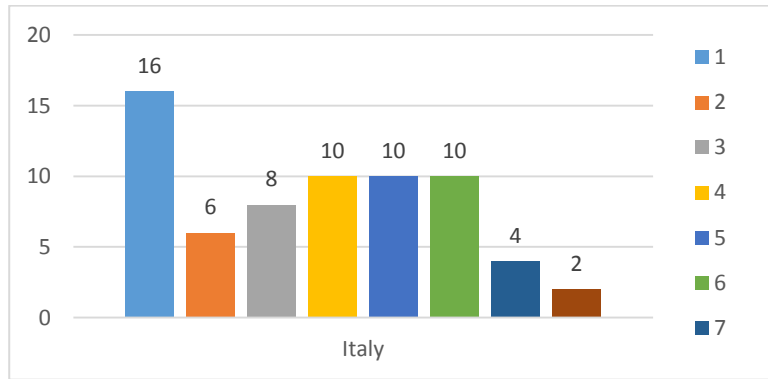


As you can see in the table above, 41% of the respondents said that are interested in, 8% are neither interested, nor disinterested and 47% are not interested. 4% of the respondents preferred not to answer the question.

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
Italy	16	6	8	10	10	10	4	2	66
Grand Total	16	6	8	10	10	10	4	2	66

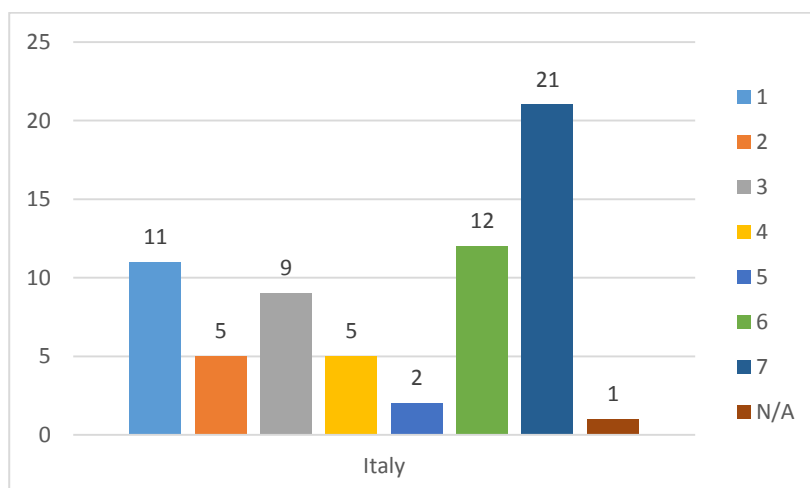


As you can see in the table above, 36% of the respondents said that are interested in, 15% are neither interested, nor disinterested and 45% are not interested.

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
Italy	11	5	9	5	2	12	21	1	66
Grand Total	11	5	9	5	2	12	21	1	66

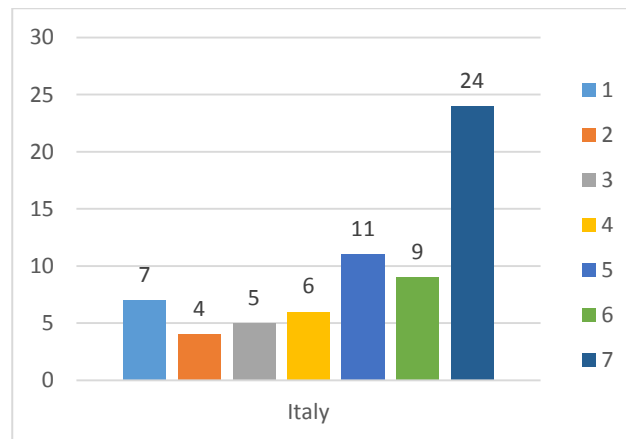


As you can see in the table above, 53% of the respondents said that are interested in, 8% are neither interested, nor disinterested and 38% are not interested. 1% of the respondents preferred not to answer the question.

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	Grand Total
Italy	7	4	5	6	11	9	24	66
Grand Total	7	4	5	6	11	9	24	66

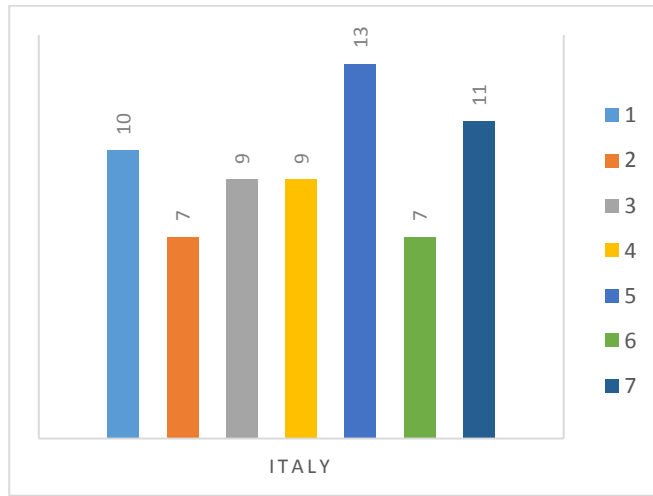


As you can see in the table above, 67% of the respondents said that are interested in, 9% are neither interested, nor disinterested and 24% are not interested.

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.

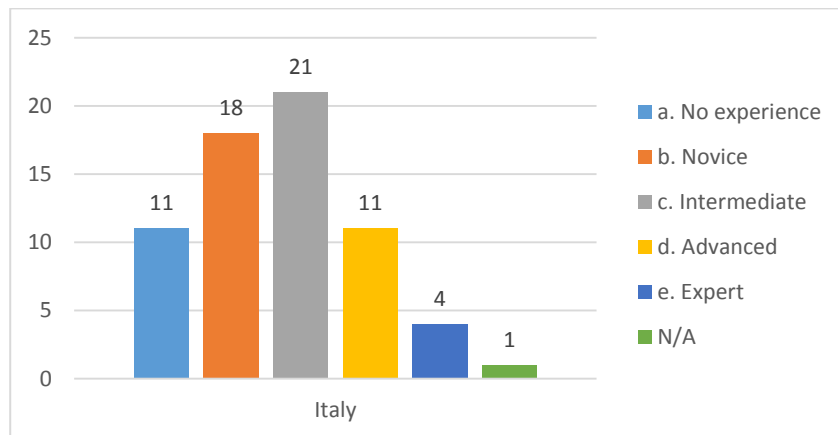
	1	2	3	4	5	6	7	Grand Total
Italy	10	7	9	9	13	7	11	66
Grand Total	10	7	9	9	13	7	11	66



As you can see in the table above, 47% of the respondents said that are interested in, 14% are neither interested, nor disinterested and 39% are not interested.

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
Italy	11	18	21	11	4	1	66
Grand Total	11	18	21	11	4	1	66

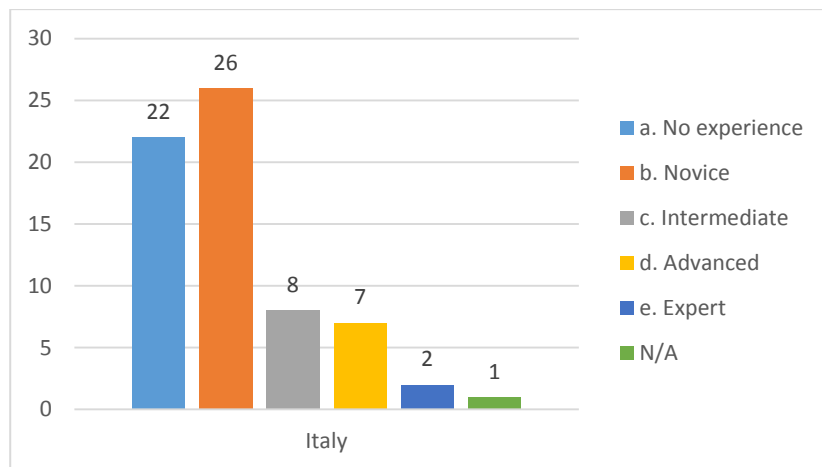


As can be seen from the previous table, 33% of respondents considered the experience with video games to be moderate, 23% rate it very high and 44% showed low interest in video games.

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	N/A	Grand Total
Italy	22	26	8	7	2	1	66
Grand Total	22	26	8	7	2	1	66



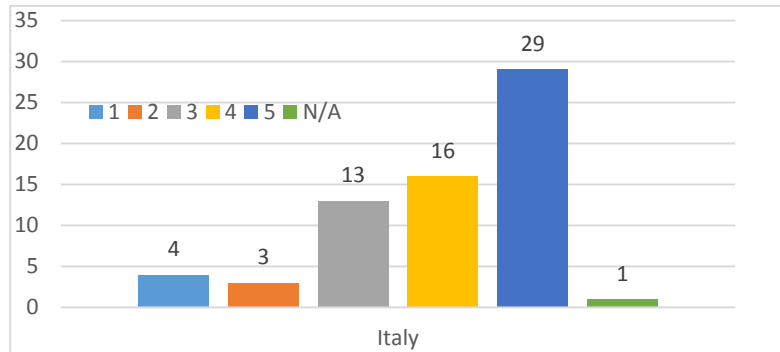
As can be seen from the previous table, 12% of respondents considered the experience with video games to be moderate, 14% rate it very high and 73% showed low interest in 3D games/environments.

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	N/A	Grand Total
Italy	4	3	13	16	29	1	66
Grand Total	4	3	13	16	29	1	66

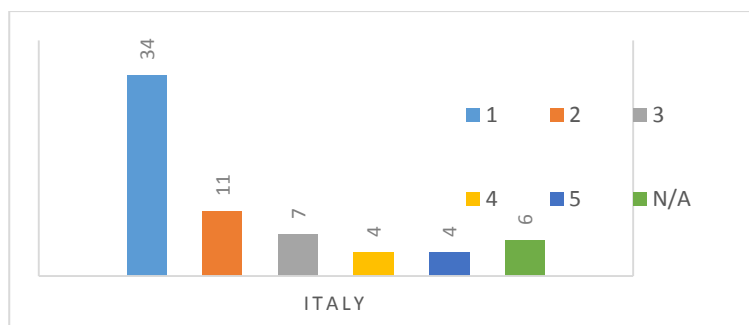


As can be seen from the previous table, 44% of respondents are more likely to use 3D world, 24% of them are neither interested, nor disinterested in using them and 30% showed low interest in 3D worlds.

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
Italy	34	11	7	4	4	6	66
Grand Total	34	11	7	4	4	6	66

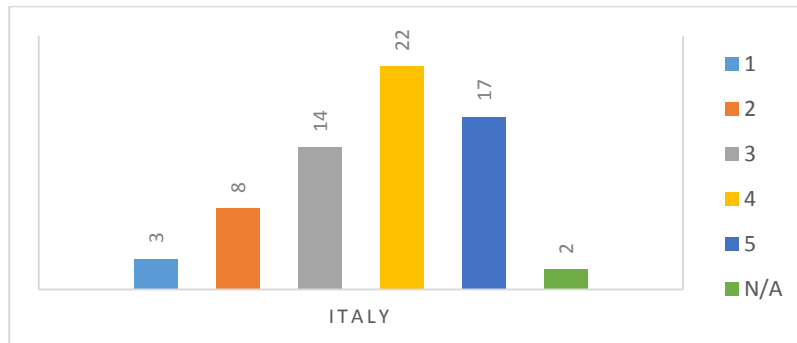


As can be seen from the previous table, 79% of respondents considered that the virtual 3D world is not so unnecessarily complex, while only 12% considered it more complex than necessary

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	N/A	Grand Total
Italy	3	8	14	22	17	2	66
Grand Total	3	8	14	22	17	2	66

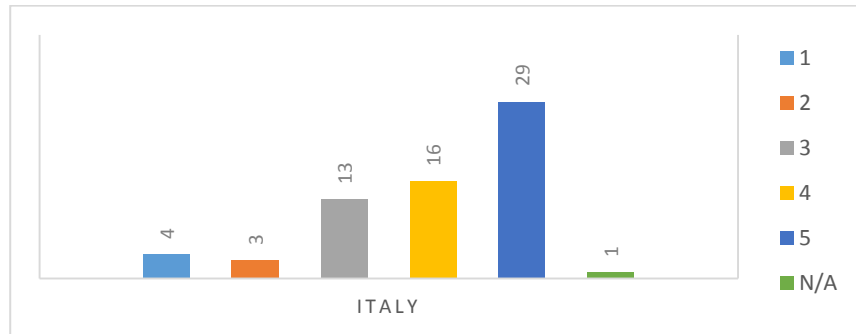


As can be seen from the previous table, 59% of respondents said 3D virtual worlds were easy to use, while 21% considered it was neither difficult nor easy to use, and only 38% disagreed. 3% of the respondents preferred not to answer.

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	N/A	Grand Total
Italy	4	3	13	16	29	1	66
Grand Total	4	3	13	16	29	1	66

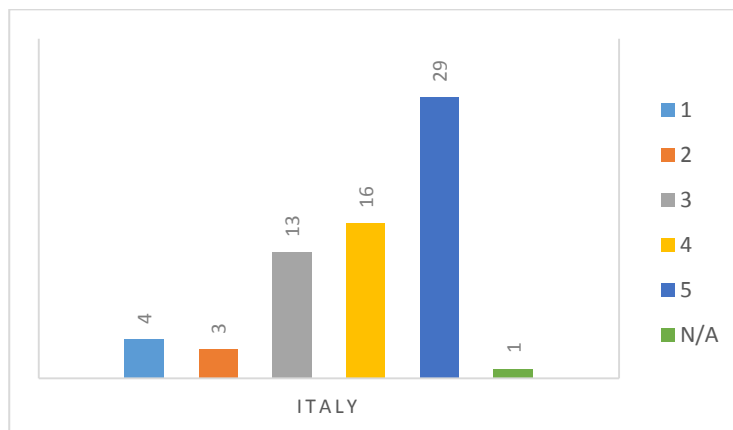


As can be seen from the previous table, 11% of respondents felt they did not need technical support to use 3D virtual worlds, while 20% said they nor not feel the need for technical support, neither reject it, while 68% said they needed technical support.

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	N/A	Grand Total
Italy	4	3	13	16	29	1	66
Grand Total	4	3	13	16	29	1	66

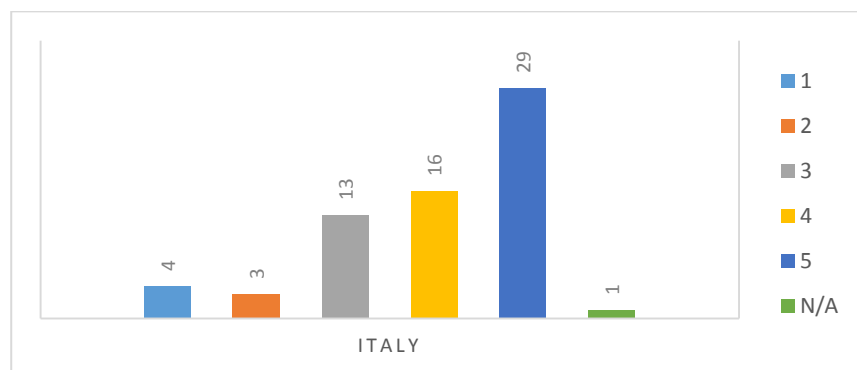


68% of respondents said that different functionalities of the 3D virtual worlds were very well integrated, while 5% did not have a clear opinion in this respect and only 11% felt that they were not sufficiently integrated.

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	N/A	Grand Total
Italy	4	3	13	16	29	1	66
Grand Total	4	3	13	16	29	1	66

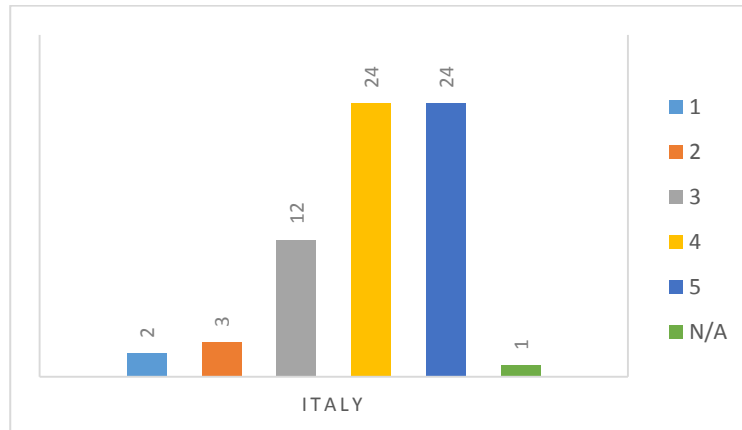


As can be seen in the previous table, 11% of respondents responded negatively to the inconsistency of 3D virtual worlds, 20% said they did not see this, and only 68% thought they were inconsistent.

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	N/A	Grand Total
Italy	2	3	12	24	24	1	66
Grand Total	2	3	12	24	24	1	66

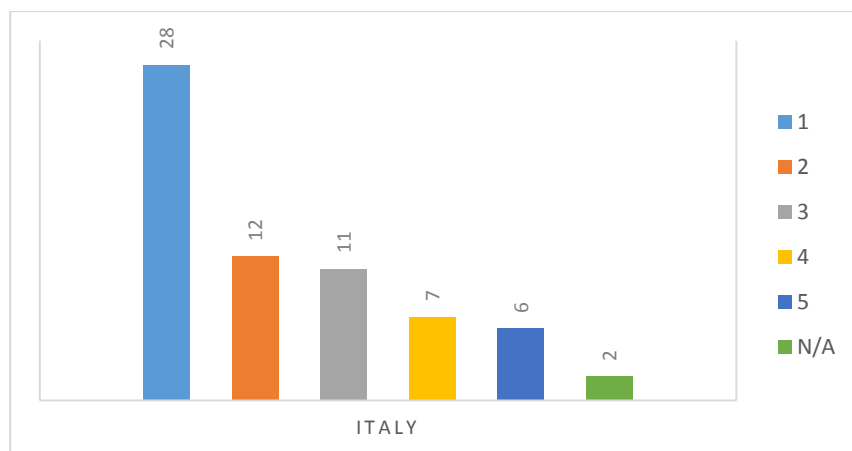


As can be seen from the previous table, 73% of respondents believe that 3D virtual worlds are useful and most can easily learn from them, while 18% consider the learning process to be balanced, while only 8% consider you can not easily learn using the 3D virtual worlds.

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	N/A	Grand Total
Italy	28	12	11	7	6	2	66
Grand Total	28	12	11	7	6	2	66

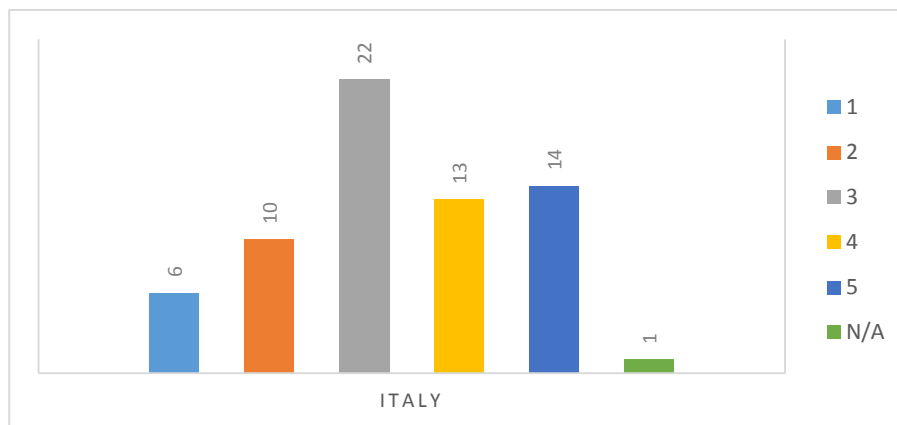


As can be seen from the previous table, 45% of respondents do not find it difficult to use 3D virtual worlds, while 17% think it is neither difficult nor easy, and 20% think it is difficult to use.

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	N/A	Grand Total
Italy	6	10	22	13	14	1	66
Grand Total	6	10	22	13	14	1	66

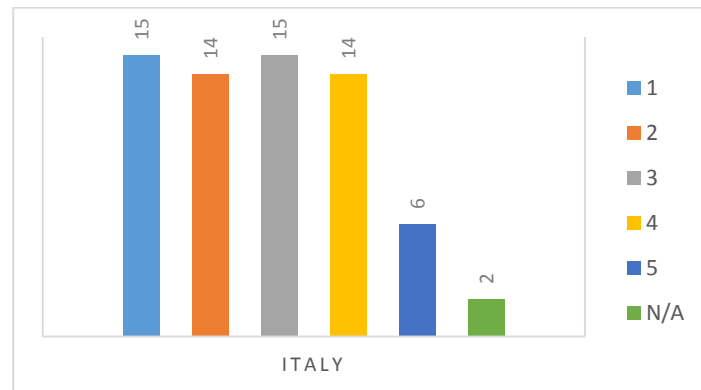


As can be seen from the previous table, 41% of respondents consider themselves confident when using 3D virtual worlds and only 24% did not feel confident.

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	N/A	Grand Total
Italy	15	14	15	14	6	2	66
Grand Total	15	14	15	14	6	2	66



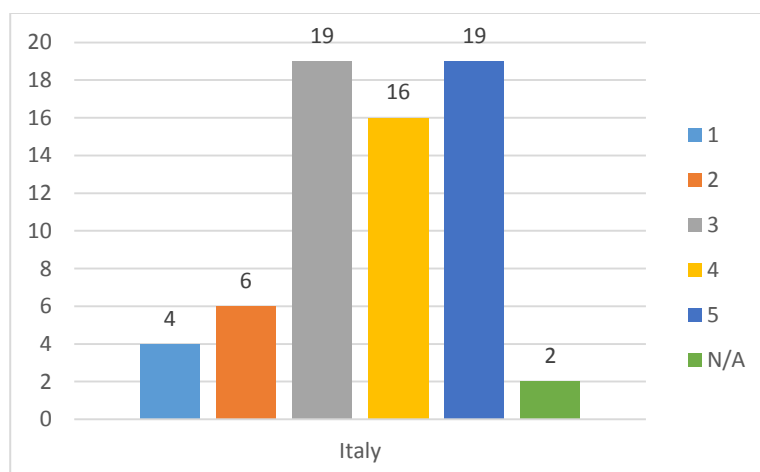
As can be seen from the previous table, 44% of respondents considered enough information to be able to go through the exercises in the virtual worlds, while 30% felt that they needed to learn a few things to go through the tests.

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	N/A	Grand Total
Italy	4	6	19	16	19	2	66
Grand Total	4	6	19	16	19	2	66

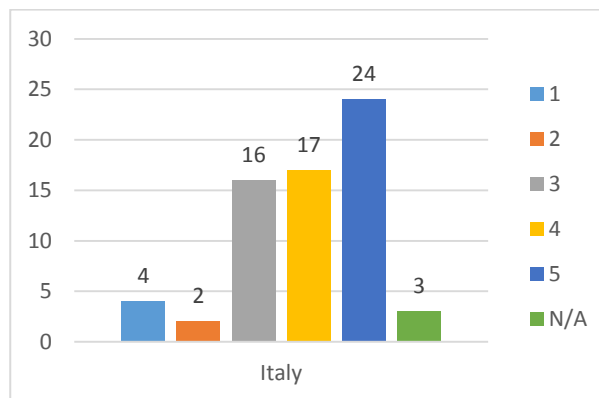


Regarding the convenience of using virtual 3D worlds as a learning method, 38% of respondents said they felt comfortable, while 15% said they did not feel comfortable.

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	N/A	Grand Total
Italy	4	2	16	17	24	3	66
Grand Total	4	2	16	17	24	3	66

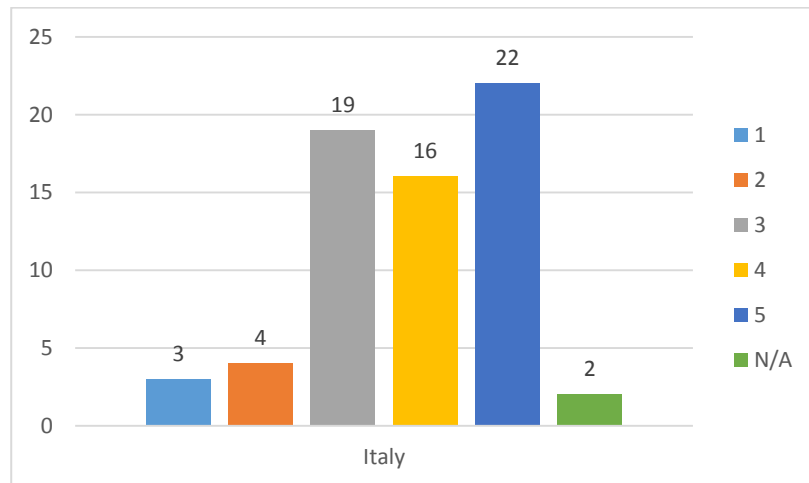


In terms of impact on learning performance, 62% agreed with the high impact of 3D virtual worlds in the learning process, while only 9% disapproved of their impact.

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	N/A	Grand Total
Italy	3	4	19	16	22	2	66
Grand Total	3	4	19	16	22	2	66

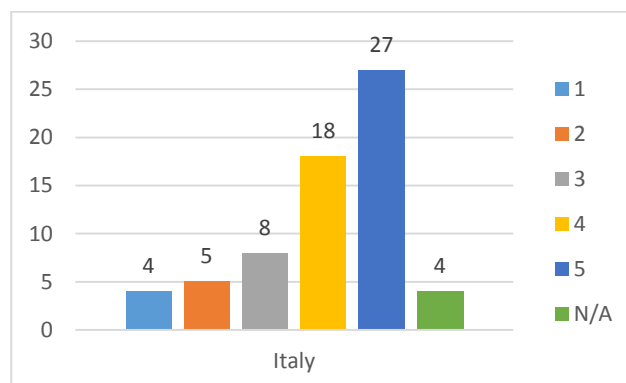


As can be seen from the previous table, 58% considered Physics study through 3D virtual worlds to be a good experience, while only 11% felt they did not help this type of learning.

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	N/A	Grand Total
Italy	4	5	8	18	27	4	66
Grand Total	4	5	8	18	27	4	66

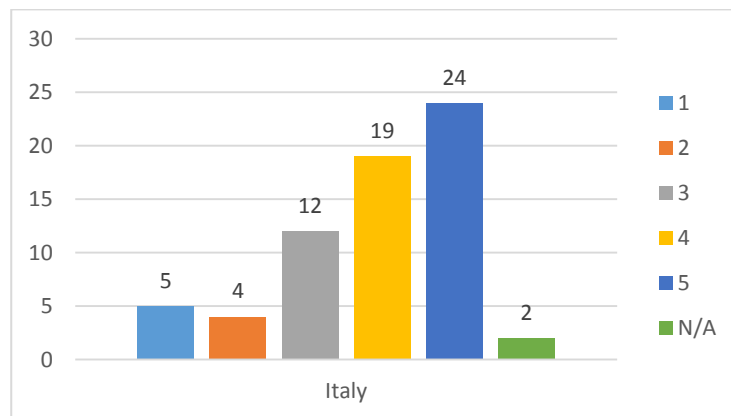


As can be seen from the previous table, 68% of respondents think they will recommend 3D virtual worlds to other friends to study Physics, while only 14% will not recommend virtual worlds.

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	N/A	Grand Total
Italy	5	4	12	19	24	2	66
Grand Total	5	4	12	19	24	2	66

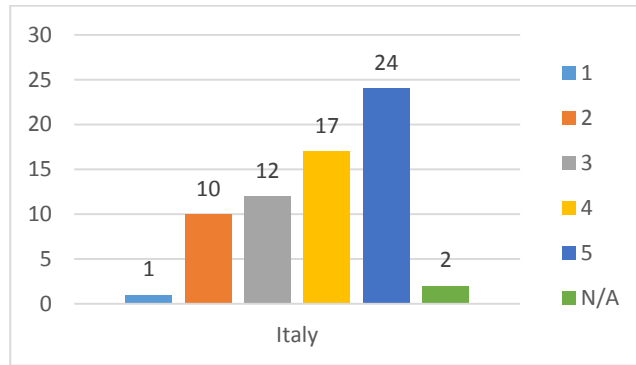


Regarding the learning experience of 3D virtual worlds, 65% of respondents said it was positive, while only 14% considered it to be a negative experience.

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	N/A	Grand Total
Italy	1	10	12	17	24	2	66
Grand Total	1	10	12	17	24	2	66

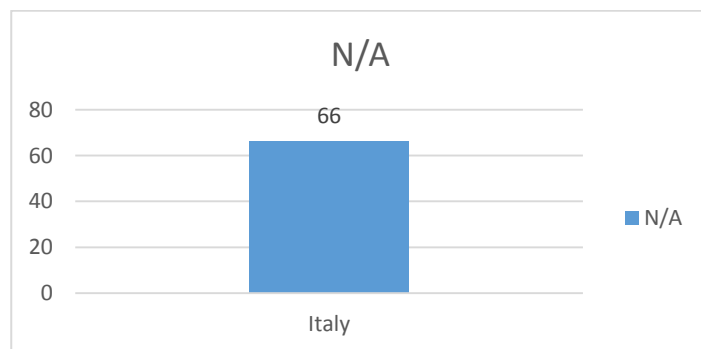


As can be seen from the previous table, 62% of respondents believe that virtual worlds significantly increase their chances of improving Physics performance, while 17% believe that the impact of virtual worlds on performance enhancement in Physics study is low.

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]

	N/A	Grand Total
Italy	66	66
Grand Total	66	66

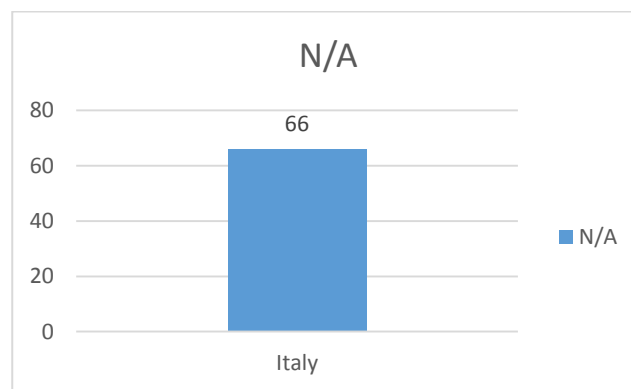


Regarding the change of opinion on the topics approached, 100% of the respondents preferred not to respond to this question.

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]

	N/A	Grand Total
Italy	66	66
Grand Total	66	66

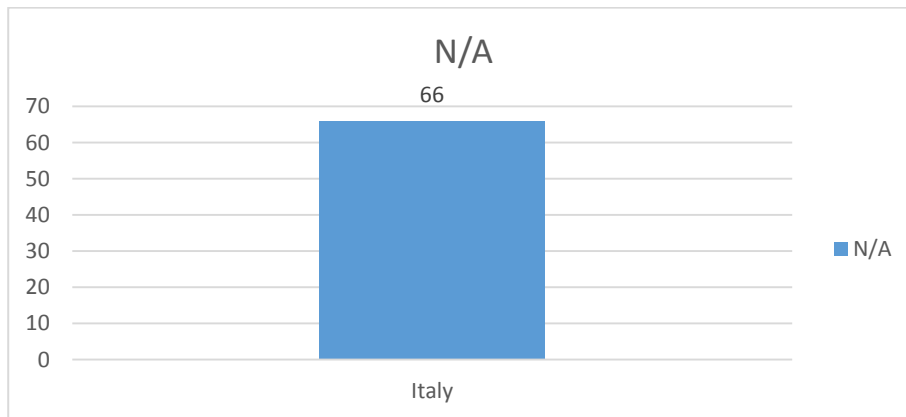


As can be seen from the previous table, 100% of the respondents preferred not to respond to this question.

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]

	N/A	Grand Total
Italy	66	66
Grand Total	66	66



As can be seen from the previous table, 100% of the respondents preferred not to respond to this question.