NATIONAL REPORTS - ITALY

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INTRODUCTION

The report describes the validation phase organized in Italy to test the Coding4Girls approach and the tools developed.

In particular, it explains the main steps of the implementation with all the target groups involved: experts, primary and secondary school teachers and 10-16 years-old students.

Moreover, it reports on the results achieved and collected through the qualitative and quantitative evaluation tools developed and submitted before and after the implementation.

ITALY

EXECUTIVE SUMMARY

The activities for the implementation and validation of C4G approach and tools took place in Italy from February to October 2020 by involving teachers and students from primary and secondary schools.

The target groups involved were teachers and students from primary and secondary schools. In addition, external experts were reached in order to validate the methodology proposed.

During all these events the qualitative and quantitative data were collected by using the evaluation tools and questionnaires designed during the project. They were constructed in the framework of a wider validation strategy foreseen in the Coding4Girls project activities with the aim to verify if the proposed pedagogical framework meets the target groups' needs in terms of relevance, acceptance, usability, and effectiveness.

According to the final results obtained, C4G platform and the game-based approach of learning scenarios permit students to achieve their learning goals with greater ease, including the students with learning difficulties. The tools developed facilitate the understanding of the contents, one learns by doing, from an interdisciplinary perspective, mixing creativity with imagination and logic with mathematics. The approach is seen as capable of overcoming the limitations of traditional teaching and favoring active learning. Therefore the proposed methodology is fully accepted because it is engaging and interesting for both girls and boys. Teacher-led "challenges" can keep the relationship between teacher/pupil and pupil/pupil alive. Students with this type of methodology have a lot of fun, as coding is an agile and effective fun tool that makes the content easy to understand. In this way, they learn to develop computational thinking to solve complex situations and problems in a playful way. Nevertheless, as one of the main obstacles towards its use, the time necessary to establish a good use and knowledge of the environment is considered. Moreover, for some, it may be too complicated and the instrument may be adaptable for some specific subjects only. Despite some teachers consider game-based learning as very effective, coding-based learning, according to them, is unsuitable for upper secondary students. For example, even though pupils are usually drawn to play and challenges, some may get tired and demotivated in the long run. Furthermore, the fun of the student is

directly proportional to his ability to master the tools available otherwise they could feel frustrated, especially those with learning difficulties. A possible improvement could be to have more types of games available. The game is fun but some teachers think that the proposed methodology is too simple for the second cycle of secondary school pupils (14-16 years old). However, seen generally, the C4G approach can be used for all ages because it can stimulate pupils' ability to develop collaborative ideas and skills and to learn complex programming concepts by playing. Usability was rated positively because it is effective due to being closely linked to the technological tools available to students both in the classroom and at home, as well as to the composition of the class. To conclude, the game-based C4G approach for developing programming skills is considered interesting in teaching because it focuses on the needs and peculiarities of the female world. Continuous training on these activities would also be interesting. Thanks to the use of these new tools, students can learn to program, analyse a problem, invent solutions, verify and communicate. Furthermore, paths focused on play seem capable of favoring receptivity to the new, emotional regulation and the possession of effective learning strategies.

IMPLEMENTATION

Workshops with teachers

According to the validation strategy defined to test C4G approach and software, three different events were organized to involved n. 102 teachers from primary and secondary schools. The events were organized in both online modality and face-to-face due to Covid19 restrictions.

The first event was held during the 2020 STEM Discovery Campaign on the 16th April 2020 in order to present to n. 16 primary and secondary school teachers both the Teachers' Platform and the Students' Game Environment were shown with special attention to the project approach, design thinking (Figure 1).

Figure 1 – First workshop with teachers

The second event was a part of the courses organized for initial teachers' education from 22nd April to 18th May for 10 hours. It involved 24 teachers from primary and secondary schools (Figure 2).

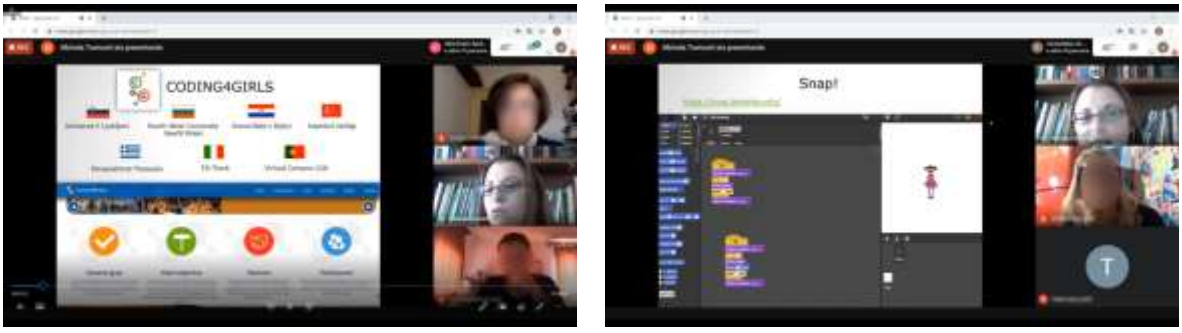

Figure 2 - Training course with teachers

Finally, the third workshop was organized in the framework of Erasmus+ KA1 Mobility for School Education at EU-Track educational center in Terracina on August 19th 2020 for 4 hours for the training "Multimedia learning environment: how to use new technologies to strengthen teaching and learning processes".

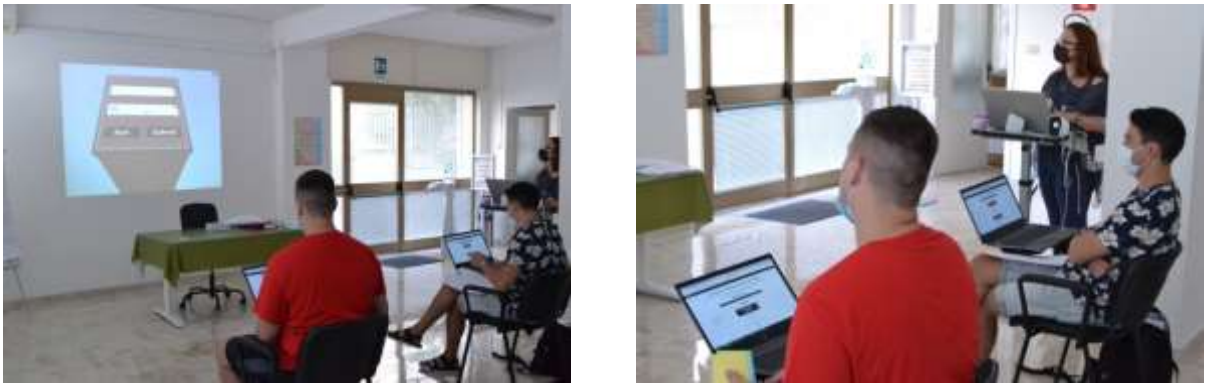

Figure 3 – Workshop with teachers during KA1 –Erasmus+ Mobility

In addition, 26 external experts in digital teaching tools were included in the validation phase organized in online modality on 10th of April 2020.

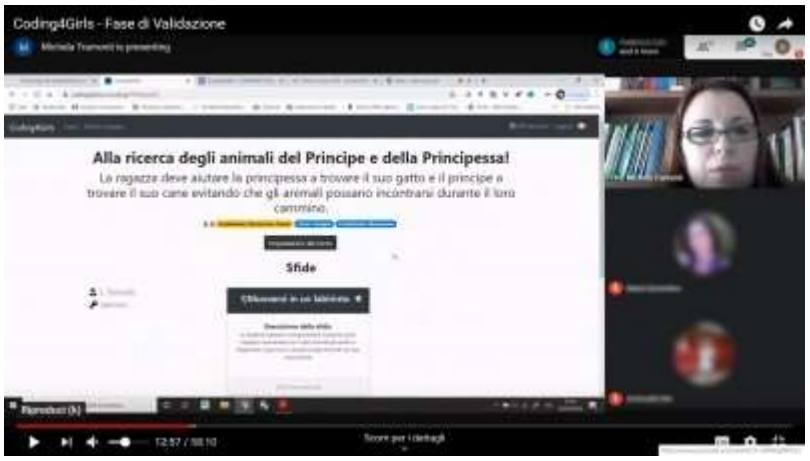

Figure 4 – Online webinar with external experts

During all these events, the project team presented the main project aims and results, the C4G approach including game-based learning and design-thinking and the Teachers' Platform and the Students' Game Environment. After that, both teachers and external experts were provided with all the documents needed to carry out the validation activities. Additional guideline in Italian was provided in order to facilitate these tasks, mainly in the online modality.

Data collection tools

During all these events the qualitative and quantitative data were collected by using the evaluation tools and questionnaires designed during the project. They were constructed in the framework of a wider validation strategy foreseen in the Coding4Girls project activities according to the following dimensions:

- the programming level evolution;
- the motivation for coding;
- the programming environment usability.

Specifically, the aim was to verify if the proposed pedagogical framework meets the target groups' needs in terms of relevance, acceptance, usability, and effectiveness.

In particular, the following tools were used:

- S1 – Preliminary questionnaire (for students)
- S2 – Follow-up questionnaire (for students)
- S3 – Student's comments
- T1 – Teacher's observations
- T2 – Teacher's comments
- E – Expert's comments

Before the submission, all the tools were translated into Italian and moved in the Google Forms (due to Covid19 restrictions). However, the data were collected through the compilation of papers only for the teachers came for the Erasmus KA1 training and the first group of the students.

Materials

The materials used during the implementation of the validation phase were the learning scenarios and instructions for students developed by the project partners; these learning scenarios were re-adapted to the design thinking approach and the structure of the C4G software constituting of two parts: the Teacher's Training Platform and the Student Game Environment.

In addition, the Italian team prepared additional materials in order to support both teachers and external expert to carry out their experience: the project summary, the

instruction and a video tutorial on how to test both the Teachers' platform and the Students' Game Environment and a video tutorial.

Setup model and procedure

The target group of students involved was from primary and secondary schools. They were dived into three groups.

The first one was constituted of students participating in an experimental experience combining two approaches, namely computational design thinking and educational robotics is described in a specific article.[1] During the first part of the experience, C4G software and approach were used to develop design thinking and game-based learning. The activities in the class lasted 10 hours.

Figure 5 – Validation activities with primary and secondary school students

Besides, other several activities were organized in October 2020 with students aged 10-12 and 13-15 years-old. Despite Covid19, the sessions with the students were held in face-to-face modality taking into attention the healthy restrictions rules.

For the first group, the workshops organized lasted 8 hours while for the second group 20 hours. In fact, the duration of the activities carried out is changed accordingly the pandemic evolution and the equipment available in the schools.

All the activities were supported by the project Italian members to help both teachers and students mainly with C4G software.

[1] The extended results of this experience are described in the following article: Dochshanov, A.; Tramonti, M. Computational Design Thinking and Physical Computing: Preliminary Observations of a Pilot Study. *Robotics* 2020, *9*, 71.

Before starting the activities the preliminary questionnaire (S1) was submitted and after the experience with the Students' Game Environment and the learning scenarios in Snap!, the follow-up questionnaire (S2) was distributed among students.

During the implementation activities, also the qualitative data on the students and teachers feedback were collected through S3 and T2.

First of all the students sessions were introduced with the mini-games and the learning scenarios where the students were expected to become familiar with the Snap! commands and to program simply scenarios. When they got experiences, they could try also advanced learning scenarios.

During the implementation, the brainstorming activities were very important to let students share and create new ideas with their class.

The T1 was compiled by teachers through Google Form in April 2020 after a specific training session addressed to them.

Moreover, the C4G approach and software were tested by an external expert. Their comments and feedback were collected through the form (E) by using Google Form during April-May 2020 due to the lock-down for Covid19.

The experts were supported by project Italian team who provided them with the access to the project documentation and to the contents designed for the Italian teachers, such as the instructional guide and the video tutorial on how to use the Teachers' Platform and the Students' game Environment.

Participants

The target group involved in the validation activities were students, teachers and experts.

Regarding the students, these activities involved 129 learners from primary and secondary schools. They took place on three different occasions. The first group participated in an experimental experience combining two approaches, namely computational design thinking and educational robotics is described. During the first part of the experience, C4G software and approach were used to develop design thinking and game-based learning. The experience was organized from February to July 2020 for n. 15 students.

The second group was constituted of 5 classes with 20 students for each (Total 100 students aged 13-15) tested both the project approach and the Students' Game Environment in October 2020 for 20 hours. In the same month, another group of 20 students aged 10-12 years old was involved in the validation phase for 8 hours.

Table 1 and Figure 6 show the number of students – participants of the study by age/grade.

Table 1 - Number of students by age/grade

Years of age	Grade	Classes	Number of students
9-10	4	1	7
10-11	5	1	20
11-12	6	1	2
12-13	7	4	81
13-14	8	3	19
Total		**10**	**129**

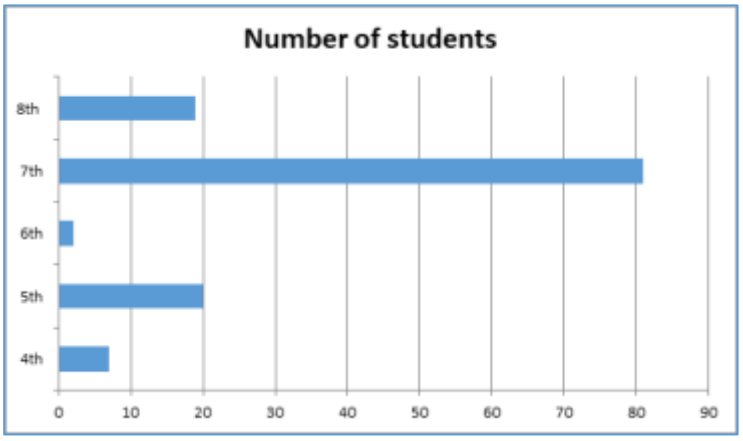

Figure 6 – Number of students by grade

Concerning the teachers, n. 102 primary and secondary schools teachers were involved in three events in both face-to-face and online modality to validate the C4G approach and the software. The first was organized on April 16th for one hour. The second was a part of the courses organized for initial teachers' education from 22nd April to 18th May for 10 hours and the third event was organized in the framework of Erasmus+ KA1 Mobility for School Education on August 19th 2020 for 4 hours.

Finally, 26 experts in digital teaching tools were included in the validation phase organized in the online modality in April 2020. They are mainly, digital animators, who are teachers experts in the ICT introduction into local, regional and national schools and they

are responsible for training and updating skills development in ICT of teachers at the national level.

RESULTS

Results of questionnaires for students

In order to collect qualitative and quantitative data, two questionnaires were submitted to students. The first, preliminary questionnaire, intended to gather information about the digital device used and the level of programming. The second, the follow-up questionnaire aimed to verify the following dimension:

- the programming level evolution;
- the motivation for coding;
- the programming environment usability.

In addition, the project member or the teachers wrote down their comment in the grid S3.

A total of 129 students were involved in the C4G activities filled in both the questionnaires according to previous planning agreed with the schools.

S1 - Preliminary questionnaire

A total of 129 students solved the preliminary questionnaire about the use of digital devices and the perceived level of programming. The mean age of students was 12.67 years (SD=1,07). Table 2 shows the distribution of the students by gender in the classes with the corresponding response rate (100% in each case) of students who solved S1. As can be seen, (Figure 7) except for 4th and 6th grades, where the only participants were boys, the female participation is dominant.

Table 2 - Number of students who solved S1 - Preliminary questionnaire by gender and grade

	4th grade	**5th grade**	**6th grade**	**7th grade**	**8th grade**	**Total**
Boys	7	5	2	23	7	44
Girls	0	15	0	58	12	85
Total	**7**	**20**	**2**	**81**	**19**	**129**
Response rate	100%	100%	100%	100%	100%	100%

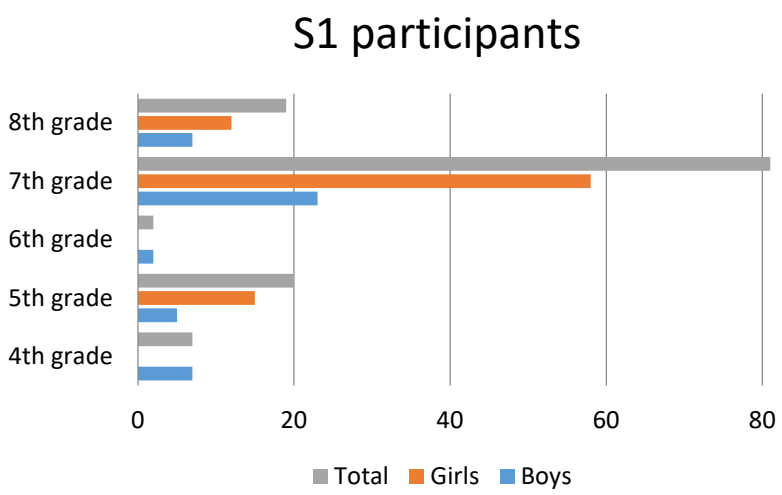

Figure 7 - Distribution of students who solved S1 - Preliminary questionnaire by gender and grade

Table 3 shows descriptive statistical analysis of participants' responses to the questions related to the use of digital devices, the internet and video-games. It is worth noting that standard deviation values reported demonstrating particular deviances for the three last questions of the inquiry in case of the boys. As to the pairwise comparison of average values obtained for boys and girls, the results (Figure 8) demonstrate clearly that boys are major consumers of the digital devices, the internet and video-games. In particular, the prevalence is more obvious for the last dimension.

Table 3 - The use of digital devices, the internet and video-games by gender

Question		**N**	**Min**	**Max**	**Mean**	SD
1. For how long have you been using computers, tablets or other digital devices (in years)?	Boys	44	2	7	4.59	1.28
	Girls	85	1	6	3.87	1.088
	Total	**129**	**1**	**7**	**4.12**	**1.203**
2. How many hours per week do you use a computer, tablet or other digital device?	Boys	44	1	15	5	2.615
	Girls	85	1	6	4.47	1.324
	Total	**129**	**1**	**15**	**4.651**	**1.874**
3. How many hours per week do you use the Internet?	Boys	44	1	21	5.432	4.117
	Girls	85	0	20	4.047	2.849
	Total	**129**	**0**	**21**	**4.519**	**3.384**
4. How many hours per week do you play video games?	Boys	44	1	21	4.068	4.915
	Girls	85	0	4	1.776	0.762
	Total	**129**	**0**	**21**	**2.558**	**3.112**

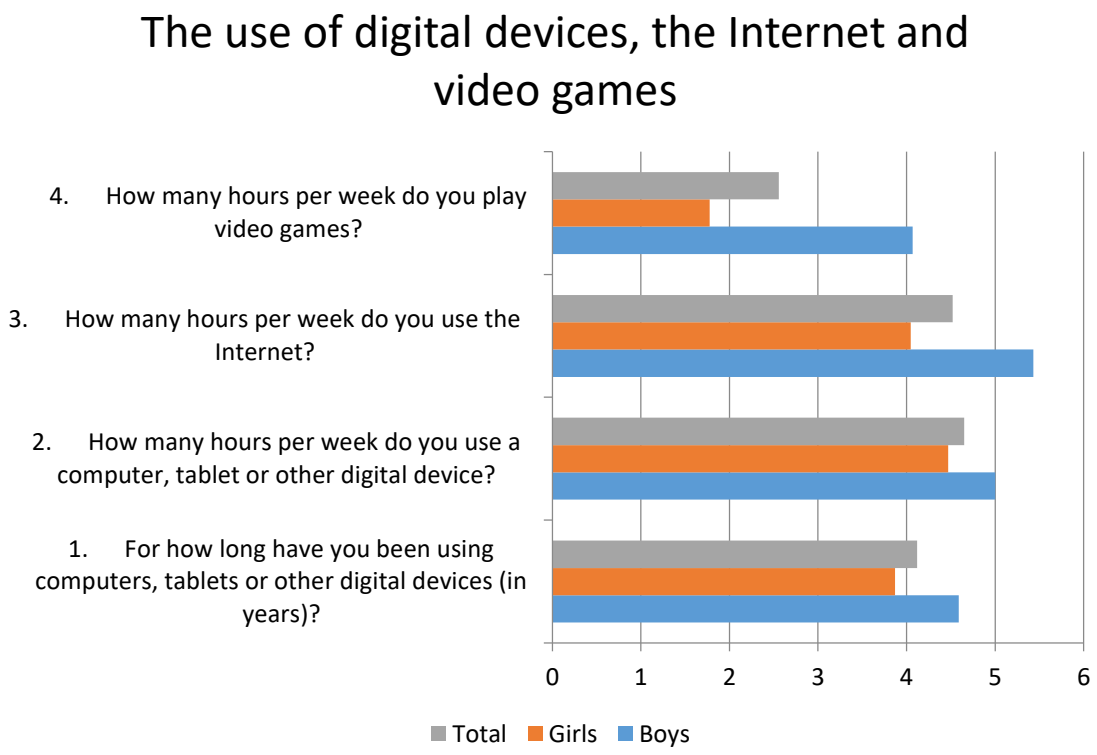

Figure 8 - The use of digital devices, the internet and video-games – comparison by gender

The average values demonstrate that girls' answers regarding the use of digital devices and the Internet are more consistent when compared to boys', namely the hours spent on the Internet per week is logically less than the value of the hours spent with a digital device. Such a discrepancy, to our opinion, may be caused by the gender differences in the Internet perception when the access instrument itself shifts backwards and simply doesn't count.

By comparing the data by grade (Table 4) the most prominent values to note are the hours per week spent for the Internet and video games on average by the boys of the 4th grade. Analysed individually, only one respondent has declared to use the Internet for 21 hours per week and 2 respondents have specified 20 and 21 hours as the time spent weekly for video games, which inevitably have significantly raised the elevated average point gained. The second-ranked is the time spent on the Internet by the boys of the sixth grade. But when seen generally (Figure 9) there is no continuous trend ranging from 4th to 8th grade.

Finally, as regards the girls, as one can see, the female students of the 7th and 8th grade in average are more active consumers of digital technology, excluding the video games, which is quite the same in all three grades.

Table 4 - The use of digital devices, the internet and video-games by grade and gender

Question		4th grade	5th grade	6th grade	7th grade	8th grade
1. For how long have you been using computers, tablets or other digital devices (in years)?	Boys	5.14	2.8	6.5	4.3	5.714
	Girls	0	2.53	0	4.14	4.25
	Total	**5.14**	**2.6**	**6.5**	**4.1852**	**4.7895**
2. How many hours per week do you use a computer, tablet or other digital device?	Boys	6	3.2	6	4.913	5.286
	Girls	0	2	0	4.914	4.583
	Total	**6**	**2.8**	**6**	**4.9136**	**4.8421**
3. How many hours per week do you use the Internet?	Boys	12.14	2	9	4.043	4.714
	Girls	0	2.13	0	4.31	5.167
	Total	**12.14**	**2.1**	**9**	**4.2346**	**5**
4. How many hours per week do you play video games?	Boys	13.57	3.4	4	1.826	2.429
	Girls	0	1.6	0	1.78	2
	Total	**13.57**	**2.05**	**4**	**1.7901**	**0.7672**

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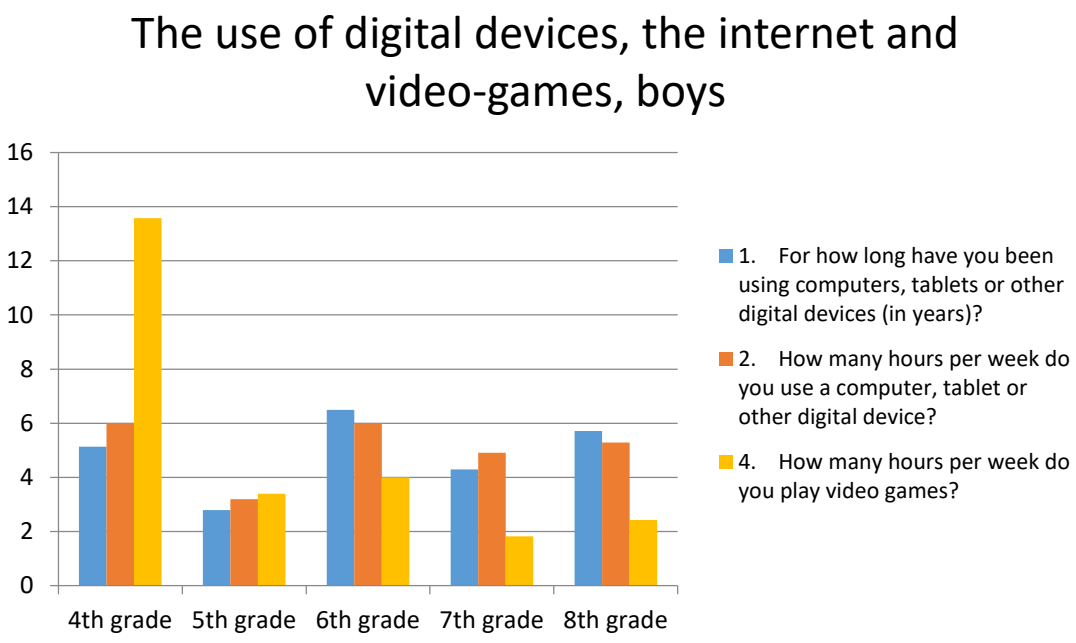


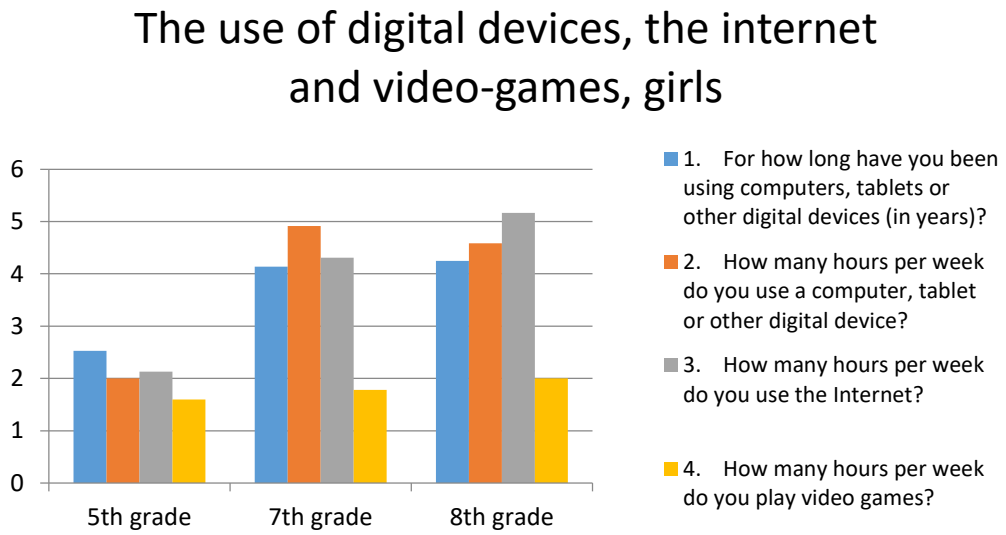


Figure 9 - The use of digital devices, the internet and video-games – comparison by gender.

The results of the participants' (N=129, 44 boys, 85 girls) programming skills self-assessment are shown in Table 5. As can be seen, the results obtained present almost no gender difference (Figure 10). Moreover, most of the students (around 70%) considered themselves as capable to code simple programs. While the resting part is composed of the novice programmers (13.95%) and those, who have never coded before (15.5%).

Table 5 - Self-assessment of programming skills by gender

Level of programming skills	**Boys**	**Girls**	**Total**
0 - I have never coded or programmed before	15,91%	15,29%	**15,5 %**
1 - I am a novice programmer (just have basic ideas)	13,64%	14,12%	**13,95%**
2 - I can code simple programs	70,45%	70,59%	**70,54%**
3 - I am fluent in programming (can create a full program)	0%	0%	0%
4 - I can design a solution of a problem in the form of a program	0%	0%	0%

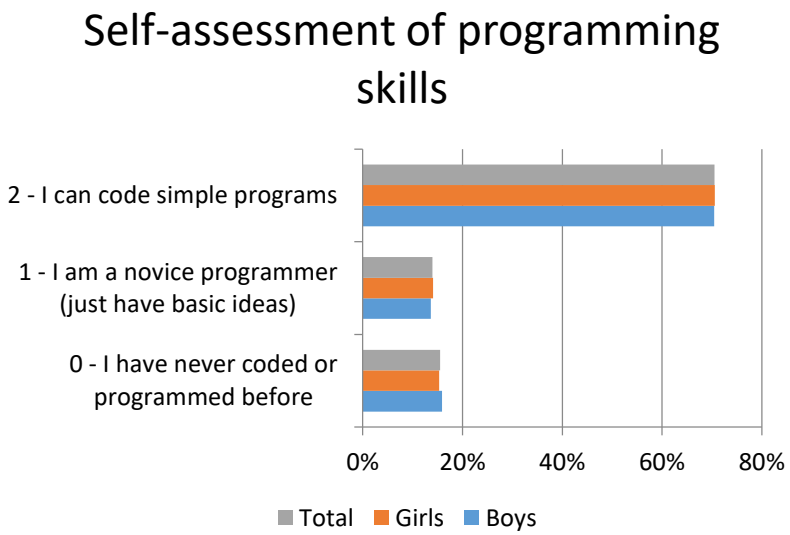


Figure 10 - Self-assessment of programming skills – comparison by gender

The analysis by grades (Table 6) shows that the largest number of students who have never coded (level 0) is from the 4th and 5th grades, as expected. While mainly the 7th and 8th-grade students are those who can code simple programs, with similar percentages obtained for males and females.

Table 6 - Self-assessment of programming skills by grade and gender

Level of programming skills		**4th grade**	**5th grade**	**6th grade**	**7th grade**	**8th grade**
0 - I have never coded or programmed before	Boys	57,14%	40%	50%	0%	0%
	Girls	0%	86,67%	0%	0%	0%
	Total	**57,14%**	**75%**	**50%**	**0%**	**0%**
1 - I am a novice programmer	Boys	0%	60%	50%	8,7%	0%

(just have basic ideas)	Girls	0%	13,33%	0%	15,52%	8,33%
	Total	**0%**	**25%**	**50%**	**13,58%**	**5,26%**
2 - I can code simple programs	Boys	42,86%	0%	0%	91,3%	100%
	Girls	0%	0%	0%	84,48%	91,67%
	Total	**42,86%**	**0%**	**0%**	**86,42%**	**94,74%**

The preliminary questionnaire has been intended to reveal the programming concepts the participants are familiar with before the experimental phase of the project. As the results revealed, the most familiar concepts are *statements* (65,12%) with no particular gender difference (Table 7), the second and third-ranked are *events* (18,6%) and *loops* (15,5%) correspondingly. As to the *variables* and *conditionals*, female awareness on these topics noticeably prevails over that of males. Finally, operators and parallelism concepts have gained no attention at all (Figure 11).

Table 7 - Familiarity with the programming concepts

Concept	**Boys**	**Girls**	**Total**
Loops	15,9%	15,29%	15,5%
Conditionals	6,81%	14,12%	7,75%
Variables	4,55%	16,47%	8,53%%
Statements (sounds, movement, looks, drawing)	65,9%	63,53%	65,12%
Operators	0%	0%	0%
Events	18,18%	18,82%	18,6%
Parallelism	0%	0%	0%

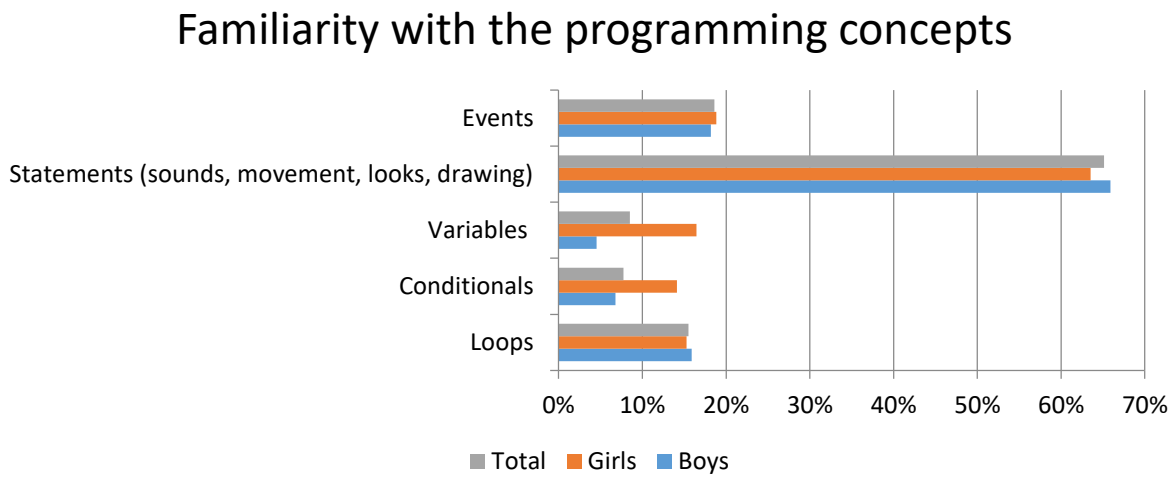


Figure 11 - Familiarity with the programming concepts – comparison by gender

Comparison of the results by grade and gender (Table 8) shows that 5th and 6th graders are at least familiar with all the concepts, with the only chosen concepts as loops and statements only.

Table 8 - Familiarity with the programming concepts by grade and gender

Concept		4th grade	5th grade	6th grade	7th grade	8th grade
Loops	Boys	28,57%	40%	0%	13,04%	0%
	Girls	0%	13,33%	0%	34,78%	16,67%
	Total	28,57%	80%	0%	14,81%	10,53%
Conditionals	Boys	0%	0%	0%	0%	0%
	Girls	0%	0%	0%	16,67%	16,67%
	Total	0%	0%	0%	16,05%	10,53%
Variables	Boys	0%	0%	0%	4,35%	14,29%
	Girls	0%	0%	0%	12,07%	25%
	Total	0%	0%	0%	9,88%	21,05%
Statements (sounds, movement, looks, drawing)	Boys	28,57%	0%	50%	86,96%	100%
	Girls	0%	0%	0%	75,86%	75%
	Total	28,57%	0%	50%	80,25%	84,21%
Operators	Boys	0%	0%	0%	0%	0%
	Girls	0%	0%	0%	0%	0%
	Total	0%	0%	0%	0%	0%
Events	Boys	14,29%	0%	0%	17,39%	42,86%
	Girls	0%	0%	0%	22,41%	25%
	Total	14,29%	0%	0%	20,99%	31,58%
Parallelism	Boys	0%	0%	0%	0%	0%
	Girls	0%	0%	0%	0%	0%
	Total	0%	0%	0%	0%	0%

Worth noticing, that the concepts' mastery with the reference to the gender is similar only regarding the *statements*. As to the resting concepts, the results gained by boys and girls differ significantly. For example, conditionals have resulted to be familiar only to girls of the 7^{th} and 8^{th} grades.

Table 9 reports students' responses on what motivates them to learn to program (students could choose one or more responses). Most of the students are motivated by the desire to show others the capacity to code (56.59%). Comparison by gender (Figure 12) shows that this factor motivates girls (38.76%) to a greater extent than boys (17.83%). While following a career in programming cannot be considered an attractive option for both sexes, succeeding in programming class as well as enjoying to solve logic problems and puzzles result to be more diffused options for the students' motivation.

Table 9 - Motivation for learning programming

Response	Boys	Girls	Total
I'm not motivated	0,78%	0,78%	0,78%
I want to succeed in the programming class	3,10%	17,83%	20,93%
I want to show other students I can program	17,83%	38,76%	56,59%

I want to follow a career in programming	3,10%	0,78%	3,88%
I enjoy solving logic problems and puzzles	10,08%	8,53%	18,6%

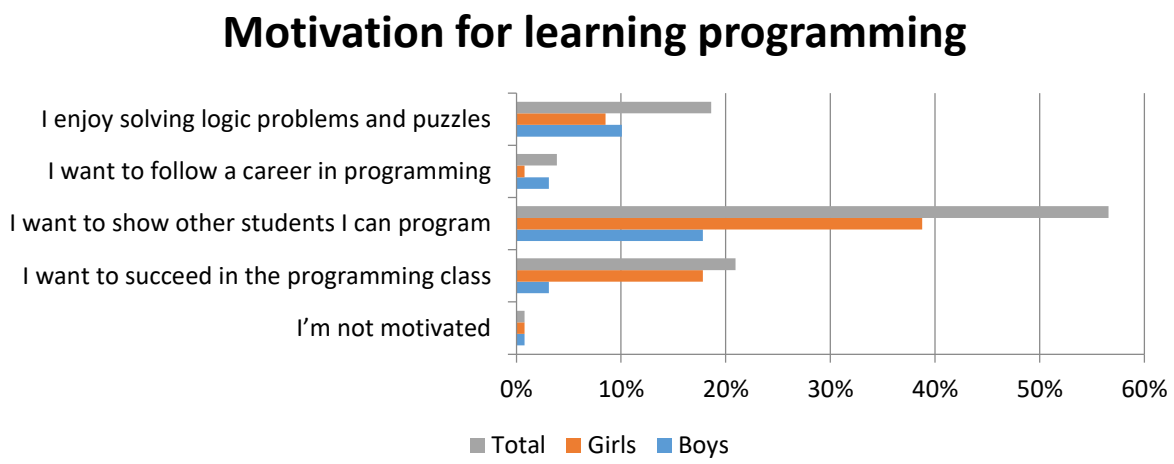


Figure 12 - Motivation for learning programming – Comparison by gender

Comparison by grade (Table 10) shows that 5th graders are the most motivated, especially by wanting to succeed in the programming class. According to the results gained the enjoyment of solving logic problems and puzzles attracts enough attention of the boys throughout all the grades, whereas the idea of following a career in programming remains attractive till the 6th grade only.

Table 10 - Motivation for learning programming by grade and gender

Statement		4th grade	5th grade	6th grade	7th grade	8th grade
I'm not motivated	Boys	14,29%	0%	0%	0%	0%
	Girls	0%	0%	0%	0%	0%
	Total	**0%**	**0%**	**0%**	**0%**	**0%**
I want to succeed in the programming class	Boys	28,57%	20%	0%	13,04%	0%
	Girls	0%	53,33%	0%	22,41%	16,67%
	Total	**28,57%**	**45%**	**0%**	**19,75%**	**10,53%**
I want to show other students I can program	Boys	14,29%	40%	0%	69,57%	14,29%
	Girls	0%	13,33%	0%	67,24%	75%
	Total	**14,29%**	**20%**	**0%**	**67,90%**	**68,42%**
I want to follow a career in programming	Boys	28,57%	20%	50%	0%	0%
	Girls	0%	6,67%	0%	0%	0%
	Total	**28,57%**	**10%**	**50%**	**0%**	**0%**
I enjoy solving logic problems and puzzles	Boys	57,14%	20%	50%	17,39%	28,57%
	Girls	0%	26,67%	0%	10,34%	8,33%
	Total	**57,14%**	**25%**	**50%**	**12,35%**	**21,05%**

S2 – Follow-up questionnaire

An equal number of students, justifying the 100% response rate, solved the follow-up questionnaire about satisfaction with programming and coding activities, satisfaction with the organization of the implementation, and perception on the acquired coding skills. The mean age of students is the same (12.67 years, SD=1,07).

In the follow-up questionnaire, students expressed their attitudes regarding the C4G learning methodology and the implementation of activities using the 5-point Likert scale (1 – strongly disagree, 2 – disagree, 3 – neutral, 4 – agree, 5 – strongly agree). From the data presented, one can see that both boys and girls have considered this way as fun. Generally, the methodology used may be considered as well accepted by either of the genders, given the averages have gained close values throughout most dimensions in both cases. Interesting, that the respondents' estimation of the programming being challenging is almost the same as its being easy. Finally, the weak side revealed, which might be of particular interest for the future adaptation of the methodology, is relatively low points for the dimension "at any time, it was clear what to do".

Table 11 – Satisfaction with C4G learning methodology

Statement		**1**	**2**	**3**	**4**	**5**	**AVG**	**SD**
1. I found programming challenging.	Boys	2,27%	20,45%	18,18%	52,27%	6,82%	3,409	0,972
	Girls	2,35%	20,00%	12,94%	61,18%	3,53%	3,435	0,932
	Total	**2,33%**	**20,16%**	**14,73%**	**58,14%**	**4,65%**	**3,426**	**0,942**
2. I found programming motivating.	Boys	0,00%	0,00%	2,27%	81,82%	15,91%	4,136	0,409
	Girls	0,00%	0,00%	0,00%	80,00%	20,00%	4,200	0,402
	Total	**0,00%**	**0,00%**	**0,78%**	**80,62%**	**18,60%**	**4,178**	**0,404**
3. I found programming easy.	Boys	0,00%	13,64%	29,55%	50,00%	6,82%	3,500	0,821
	Girls	0,00%	17,65%	31,76%	48,24%	2,35%	3,353	0,797
	Total	**0,00%**	**16,28%**	**31,01%**	**48,84%**	**3,88%**	**3,403**	**0,805**
4. I enjoyed programming.	Boys	0,00%	0,00%	0,00%	75,00%	25,00%	4,250	0,438
	Girls	0,00%	0,00%	1,18%	77,65%	21,18%	4,200	0,431
	Total	**0,00%**	**0,00%**	**0,78%**	**76,74%**	**22,48%**	**4,217**	**0,432**
5. I understood most of programming concepts.	Boys	0,00%	2,27%	4,55%	84,09%	9,09%	4,000	0,482
	Girls	0,00%	0,00%	2,35%	83,53%	14,12%	4,118	0,391
	Total	**0,00%**	**0,78%**	**3,10%**	**83,72%**	**12,40%**	**4,078**	**0,426**
6. Learning this way is fun.	Boys	0,00%	0,00%	0,00%	61,36%	38,64%	4,386	0,493
	Girls	0,00%	0,00%	0,00%	60,00%	40,00%	4,400	0,493
	Total	**0,00%**	**0,00%**	**0,00%**	**60,47%**	**39,53%**	**4,395**	**0,491**
7. I felt engaged with this way of learning.	Boys	0,00%	2,27%	6,82%	72,73%	18,18%	4,068	0,587
	Girls	0,00%	0,00%	0,00%	68,24%	31,76%	4,318	0,468
	Total	**0,00%**	**0,78%**	**2,33%**	**69,77%**	**27,13%**	**4,233**	**0,523**
8. The activities were relevant to learn.	Boys	2,27%	0,00%	6,82%	65,91%	25,00%	4,114	0,722
	Girls	0,00%	0,00%	4,71%	70,59%	24,71%	4,200	0,507
	Total	**0,78%**	**0,00%**	**5,43%**	**68,99%**	**24,81%**	**4,171**	**0,588**

9. At any time, it was clear what I had to do.	Boys	0,00%	4,55%	18,18%	75,00%	2,27%	3,750	0,576
	Girls	0,00%	2,35%	16,47%	72,94%	8,24%	3,871	0,573
	Total	**0,00%**	**3,10%**	**17,05%**	**73,64%**	**6,20%**	**3,829**	**0,575**
10. What I learned will be relevant for my future.	Boys	0,00%	0,00%	4,55%	65,91%	29,55%	4,250	0,534
	Girls	0,00%	0,00%	12,94%	56,47%	30,59%	4,176	0,640
	Total	**0,00%**	**0,00%**	**10,08%**	**59,69%**	**30,23%**	**4,202**	**0,604**

To reveal the trend of programming skills evolution the corresponding inquiry scaled from *0 - I have never coded or programmed before* to *4 - I can design a solution of a problem in the form of a program* has been undertaken. A total of 129 students (44 boys, 85 girls) solved the preliminary and the follow-up questionnaire, thus enabling the self-assessment comparison. Table 12 shows data on the difference between the self-assessed initial level and the self-assessed final level of programming skill. As can be seen, despite the majority remained at the same level (57,36%), essential percentage of the participants (29,47%, taking into account the total percentage of the positive differences) have improved their programming skills, with the difference of 1 point as the major one. Worth noting, the significant percentage of the participants with deteriorated self-assessment (13,18%). Analysed individually, all the contributors with negative evolution trend initially have self-assessed themselves at the level 2 – corresponding to the capacity of simple programs coding. Nevertheless, it might be concluded that the situation is caused by the over-estimation of ones' capabilities. Taking into account gender differences, it can be concluded that slightly more girls discovered their preliminary self-assessment inconsistency with the actual situation (14,12%), but at the same time, significantly more girls progressed by one level than boys. And only a certain percentage of boys result to have progressed for more than 3 points.

Table 12 - The difference between the self-assessed levels of programming skill

	Difference				
	-1	**0**	**1**	**2**	**3**
Boys	11,36%	59,09%	13,64%	9,09%	6,82%
Girls	14,12%	56,47%	23,53%	5,88%	0,00%
Total	13,18%	57,36%	20,16%	6,98%	2,33%

A Wilcoxon's signed rank test for paired samples showed that students self-assessed their programming skill significantly higher after the C4G activities compared to self-assessment before the C4G activities (Table 13). The results of rank-biserial correlation (rB),

which are considered as an effect size, show large effect size, overall and by gender. The negative effect size speaks in a favour of the S2 prevalence. The result may be considered as statistically significant, as p is well below 5% threshold.

Table 13 - Comparison of self-assessment of programming skill

		Descriptive statistics					Wilcoxon's signed rank test results		
		N	**MIN**	**MAX**	**MEAN**	**SD**	**W**	**p**	**Effect size (rB)**
Boys	S1	44	0	2	1,523	0,846	24	0.00424	-0.6555
	S2	44	0	3	1,932	0,587			
Girls	S1	85	0	2	1,565	0,731	198	0.02034	-0.3806
	S2	85	1	2	1,776	0,419			
Total	**S1**	**129**	**0**	**2**	**1,550**	**0,75**	**374**	**0.0009**	**-0.4474**
	S2	**129**	**0**	**3**	**1,829**	**0,486**			

Students' comments

The analysis of the students' comments reveals that for those who were approaching the coding for the first time the project experience was captivating because through the games they have learnt simple basic programming, although requiring more time to become familiar with the tools of the Students' Game Environment. Instead, for those, who already had basic skills in coding, the experience was a way to learn more through more complex learning scenarios. For all students, the experience of using the games in the Students Game Environment was both fun and interesting because enabled them to see actually what kind of product is attainable through the coding. No relevant differences between boys and girls were noticed.

Among the suggested improvements the students have underlined: a) increasing the number of the games available; b) improving some graphics elements related to the lobby setting; c) the possibility to use some more complex and attractive learning scenarios through Snap! (mainly for secondary school students).

Teachers' observations and comments

Teachers' observations

According to teachers' observations, students were actively involved in solving the challenges provided in the learning scenarios. The activities were individual and in small groups. While the first were carried out for coding simple games already prepared in the developed learning scenarios. The others were carried out, mainly, in the Students' Game

Environment, when they were challenged to play the different games available. Besides, the attention of a whole class of students was captured by the brainstorming activities where they were asked to share and to generate new ideas, to perform alternative programs and to discuss the topics met on the coding operations. The use of the games supported the learning and teaching process effectively because in this way students were more interested and motivated to learn even more complex scenarios, including the use of variables and operations.

The C4G approach is suitable for different kinds of learning styles thanks to the use of challenges and the learning scenarios designed for several levels of difficulty. However, a time required for some students to become familiar with the Students' Game Environment, being related to their background ICT competences, is crucial for the motivation level maintaining. But, once “ice is broken” the motivation and interest were greater than before. Some technical issues arose due to the weak technological infrastructure in the schools or the devices available at home. No particular differences in the learning process and involvement levels between girls and boys were observed.

It would be desirable, in the case of the secondary school (Second cycle), that the learning scenarios proposed are more complex and articulated.

Teachers’ comments

The analysis of teachers’ comments has shown that according to the majority C4G is considered as a good tool for supporting teaching activities and learning objectives’ achievement through mediation with the teacher, even in cases of students with learning difficulties. The interacting Teachers' platform and Student Game Environment, the vast variety of learning scenarios and games, being engaging, increase the pupil's motivation and commitment, facilitate the understanding of the contents, one learns by doing, following interdisciplinary perspective, mixing creativity with imagination and logic with mathematics.

With this activity, the pupil is fully involved in active learning. This approach is believed to potentially overcome the limitations of traditional teaching. Furthermore, if a teacher were able to plan and propose activities of this type frequently, it is strongly believed that the whole class would be more involved. Once the students became familiar

with the medium, teacher-led "challenges" can keep the relationship between teacher/pupil and pupil/pupil alive.

Additionally, this approach challenges students and helps them see the big picture before designing a detailed solution. The game-based C4G approach is effective thanks to the structure of the challenges and the different levels of difficulty and the ability to discuss them in the brainstorming section ensuring its effectiveness.

However, even though pupils are usually drawn to play and challenges, some may get tired and demotivated in the long run. A possible improvement could be to have more types of games available.

Worth noting, that both the implementation and validation processes were perceived as well organized and surely are to be proposed and shared with teachers and students. In addition, platform’s usability was rated positively, because it is effective and closely linked to the technological tools available to students both in the classroom and at home, as well as to the composition of the class.,

Notwithstanding of some teachers’ opinion that the proposed methodology is too simple for the second cycle of secondary school pupils (14-16 years old), the C4G approach can be used for all ages because it can stimulate pupils' ability to develop collaborative ideas and skills and to learn complex programming concepts by playing while bringing into the focus the interests of the community and challenging them to think entrepreneurially about digital technologies and their use to address real-world problems.

Furthermore, paths focused on play seem capable of favoring receptivity to the new, emotional regulation and the possession of effective learning strategies. Some suggestions: 1. Maybe polishing the software a bit more, making it more stable and intuitive; 2. It would be useful to create an App to be installed on mobile.

To conclude, the proposed learning methodology was found as captivating for both girls and boys, stimulate a greater interest in the discipline, enhance computer skills, keep curiosity high, fix information through play, educate for innovation, invite to continually descend in to the field by exploiting the collaboration of others, while maintaining and promoting one's individuality.

Experts' comments

The C4G proposed tools and methodology may favour the achievement of learning objectives due to their suitability for all age groups. It is an interactive and alternative way to acquire skills by stimulating curiosity and motivation. The activities within the platform are well structured according to the reference objectives; and the achievement of the last, in turn, will also depend on how the teacher has structured them inside the Teachers' Platform through the coding scenarios.

Developing programming skills through game-based learning and design thinking is considered as very effective especially when facilitated through multiple interaction modalities: individual or group work, face to face sessions or online. In this way, students are more motivated to complete the assigned tasks. The challenges structure guides and stimulates the students to move on to the next advanced steps.

Besides, the integration of the teacher and student platforms acts as an interactive guide and facilitates programming skills by creating customized learning scenarios. Therefore, the C4G approach will be effective to build coding skills in both girls and boys, especially if mediated by the teacher.

Special attention of experts was paid to the graphics design in the Students' Game Environment that was reported as captivating together with the challenge modalities at different levels that are suitable for the age of the engaged students, including those who have difficulty with traditional teaching as well. However, an improvement, which could be made, is to have more types of games available and to improve the graphics at the initial part in the Students' Game Environment (lobby room).

The overall organization of the implementation as well as usability and acceptance are excellent. The method, which is innovative compared to traditional teaching methods, can bring teachers and educators closer to students' world. Finally, according to the experts, the methodology can be used, above all, in two-year classes where the skills to be acquired are still the basic ones.

DISCUSSION AND CONCLUSIONS

Thus, on the base of the data presented, the overall experience of C4G methodology introduction can be estimated from two points: 1) the actual perception of the platform by

students and teachers, and 2) the benefits revealed during the comparison of programming skills self-assessment before and after C4G activities.

Regarding the first point, as one can see from the students' and teachers' comments provided previously, the quality of interaction with the platform was assessed positively by both parties involved. In particular, the methodology adopted turned out to be flexible in practice, permitting students to benefit equally well according to their initial background. The use of the games in the Students Game Environment, as a part of the multiperspective exposition of the underlying concepts (show the big idea before a detailed elaboration), has attracted the attention of participants enabling them to see the products attainable through coding. The approach is well accepted by either of the genders, given the averages have gained close values throughout most dimensions in both cases. Finally, in terms of the room for future improvements, it is recommended to adopt measures to raise the points got by inquiry - "at any time, it was clear what to do".

From their side, teachers have consensually declared that, while mediated, C4G platform and methodology is a good tool for supporting teaching activities and learning objectives, and is believed to overcome the limitations of traditional teaching. Moreover, both teachers and experts agreed upon the usability of the approach in case of the students with learning difficulties as well.

Furthermore, the general trend of the participants' coding skills evolution is reflected in the essential percentage of the participants who improved their programming skills. Interesting to add, that following initial intentions of the project, a significant percentage of girls (major as compared to the same difference level of boys) declared to have improved their coding skills by 1 point. Certainly, the results achieved could be even higher provided that the preliminary self-assessment procedures were more detailed and elaborated.

Important to note, that most teachers, involved in the testing phase, have shown their interest in deepening of the use of C4G approach even after the validation activities organized by the project team.

To conclude, below the most recognized strong points of the methodology are listed:

- Personalized learning scenarios for programming skills developing;
- Development of the students' specific skills focused on the problem analysis and solving, creating new solutions and ideas, verifying new opportunities and communicating with others in team working;

- The serious games designed can facilitate emotional involvement and development and promote more effective learning strategies, mainly in girls.

And to promote the methodology refinement during the future implementations the following points were stressed:

- The software should be more stable and intuitive to reduce the training time that teachers need before implementing the C4G software in their practice;
- Improving the graphics of the games to make them more appealing for secondary school students;
- Increasing the number and type of the serious mini-games available in both Teachers' Platform and Students' Game Environment.

ANNEXES

S1. PRELIMINARY QUESTIONNAIRE FOR STUDENTS (in Italian)

S1. QUESTIONARIO PRELIMINARE PER GLI STUDENTI

Questo è un sondaggio preliminare relativo all'uso dei dispositivi digitali e all'esperienza nella programmazione condotta all'interno del progetto CODING4GIRLS che mira a favorire lo sviluppo delle capacità di programmazione attraverso i *serious game*.

Le tue risposte saranno **anonime** e usate solo per gli scopi della ricerca.
Grazie in anticipo per il tempo e la cooperazione!

Prima di tutto, per favore **leggi il codice** ricevuto prima dal tuo insegnante.

INFORMAZIONI GENERALI

Codice: _____ Scuola: _____

Età: _____ Classe: _____

Sesso: M F

L'USO DEI DISPOSITIVI DIGITALI, INTERNET E VIDEO-GAMES

1. Da quanto tempo usi computer, tablet o altri dispositivi digitali?	_____ anni
2. Per quante ore alla settimana usi il computer, tablet o altri dispositivi digitali?	_____ ore
3. Per quante ore alla settimana usi Internet?	_____ ore
4. Per quante ore alla settimana giochi ai video games?	_____ ore

ESPERIENZA NEL CODING E NELLA PROGRAMMAZIONE

5. Qual è il tuo livello di programmazione, adesso? *Indica la risposta più appropriata.*
   a) Non ho mai usato il coding o mai programmato prima
   b) Sono un programmatore principiante (ho solo idee di base)
   c) Posso codificare programmi semplici
   d) Sono in grado di programmare (posso creare un programma completo)
   e) Sono in grado di progettare una soluzione di un problema sotto forma di un programma

6. Se hai già fatto un po' di coding, quale dei seguenti concetti ti è familiare? *Scegli uno o più risposte.*

   ☐ Loop ☐ Variabili ☐ Eventi
   ☐ Condizionali ☐ Operatori ☐ Parallelismi
   ☐ Comandi (suoni, movimento, aspetto, disegno)

7. Qual è la tua motivazione per programmare? *Scegli uno o più risposte.*

   ☐ Non sono motivato
   ☐ Voglio riuscire nella programmazione realizzata in classe
   ☐ Voglio mostrare agli altri studenti che posso programmare
   ☐ Voglio perseguire una carriera nella programmazione
   ☐ Mi diverto a risolvere problemi di logica e puzzles
   ☐ altro _____

S2. FOLLOW-UP QUESTIONNAIRE FOR STUDENTS (in Italian)

S2. QUESTIONARIO DI FOLLOW-UP PER GLI STUDENTI

Questo è un sondaggio di approfondimento sulla soddisfazione avuta con la metodologia di apprendimeto C4G e l'implementazione delle attività per l'acquisizione di competenze di programmazione e del coding.

Le tue risposte saranno anonime e usate solo per gli scopi della ricerca.
Grazie in anticipo per il tempo e la cooperazione!
Per favore, scrivi sotto **il codice** ricevuto dal tuo insegnante (è lo stesso codice che ha usato nel questionario preliminare).

INFORMAZIONI GENERALI

Codice: _____	Scuola: _____
Età: _____	Classe: _____
Sesso: M F	

METODOLOGIA DI APPRENDIMENTO C4G

8. Classifica le seguenti affermazioni:	*Fortemente in disaccordo*	*In disaccordo*	*Neutrale*	*D'accordo*	*Molto d'accordo*
a) ho trovato la programmazione impegnativa.	1	2	3	4	5
b) ho trovato la programmazione motivante.	1	2	3	4	5
c) ho trovato la programmazione facile.	1	2	3	4	5
d) mi è piaciuto programmare.	1	2	3	4	5
e) ho compreso la maggior parte dei concetti di programmazione.	1	2	3	4	5
f) imparare in questo modo è divertente.	1	2	3	4	5
g) mi sono sentito impegnato in questo modo di apprendere.	1	2	3	4	5
h) le attività erano rilevanti per l'apprendimento.	1	2	3	4	5
i) in qualsiasi momento, era chiaro cosa dovevo fare.	1	2	3	4	5
j) quello che ho imparato sarà rilevante per il mio futuro.	1	2	3	4	5

LIVELLO PERCEPITO DI PROGRAMMAZIONE

9. Qual è il tuo livello di programmazione, ora? *Indica la risposta più appropriata.*

a) Non ho mai usato il coding o non mai programmato prima

b) Sono un programmatore principiante (ho solo un'idea di base)

c) Posso codificare programmi semplici

d) Sono in grado di programmare (posso creare un programma completo)

e) Sono in grado di progettare una soluzione di un problema sotto forma di un programma					
USABILITA' DELL'AMBIENTE DI GIOCO					
10. Classifica le seguenti affermazioni:	*Fortemente in disaccordo*	*In disaccordo*	*Neutrale*	*D'accordo*	*Molto d'accordo*
a) vorrei usare questo gioco frequentemente.	1	2	3	4	5
b) ho trovato il gioco complesso.	1	2	3	4	5
c) il gioco è stato facile da usare.	1	2	3	4	5
d) ho avuto bisogno del supporto di un tecnico per poter usare questo gioco.	1	2	3	4	5
e) le varie funzioni di questo gioco sono ben integrate.	1	2	3	4	5
f) c'è stata troppa incoerenza nel gioco.	1	2	3	4	5
g) molte persone imparerebbero ad usare questo gioco rapidamente.	1	2	3	4	5
h) il gioco è stato molto complicato da usare.	1	2	3	4	5
i) mi sono sentito molto fiducioso durante l'utilizzo del gioco.	1	2	3	4	5
j) avevo bisogno di imparare molte cose prima di poter iniziare con questo gioco.	1	2	3	4	5

S3. STUDENT'S COMMENTS (in Italian)

S3. I COMMENTI DEGLI STUDENTI
Dopo l'implementazione dell'approccio basato sul gioco C4G finalizzata allo sviluppo delle capacità di programmazione, gli insegnanti raccolgono le opinioni e i commenti qualitativi degli studenti emersi in un'intervista di gruppo e li trascrivono. Per favore, raggruppa tutti gli studenti e raccogli le loro opinioni e commenti qualitativi. Chiedi agli studenti gli aspetti elencati di seguito e trascrivi i loro commenti, esposti oralmente, utilizzando questo modulo. Grazie per il tempo e la collaborazione!
INFORMAZIONI GENERALI
Insegnante: _____ Classe: _____ Scuola: _____ Data: _____
ORGANIZZAZIONE GENERALE E PERCEZIONI DEGLI STUDENTI
Puoi chiedere agli studenti la loro opinione in merito all'organizzazione complessiva dell'implementazione, la loro percezione sulle conoscenze acquisite, la loro percezione sulla pertinenza e l'efficacia dell'apprendimento basato sul gioco e la loro percezione sul divertimento raggiunto.
PROBLEMI O DIFFICOLTA' DI APPRENDIMENTO
Puoi chiedere agli studenti sulle difficoltà di apprendimento o sui problemi che hanno dovuto affrontare durante il corso e cosa hanno fatto quando hanno riscontrato questi problemi.
VISUALIZZAZIONI DEGLI STUDENTI SU COME MIGLIORARE LA METODOLOGIA C4G, GLI STRUMENTI E I CONTENUTI
QUALSIASI ALTRA COSA RITENUTA RILEVANTE

T1. TEACHER'S OBSERVATIONS (in Italian)

T1. OSSERVAZIONI DEGLI INSEGNANTI
Durante l'implementazione delle sessioni, gli insegnanti osservano e documentano la reazione degli studenti nonché i loro progressi nella costruzione delle capacità di programmazione usando l'approccio C4G basato sul gioco. Per favore, usa questa scheda e indica ciò che hai osservato riguardo gli aspetti indicati precedentemente. Grazie per il tuo tempo e la cooperazione!
INFORMAZIONI GENERALI
Insegnante: _____ Classe: _____ Scuola: _____ Data (da-a): _____
PARTECIPAZIONE E IMPEGNO DEGLI STUDENTI
Gli studenti sono attivamente coinvolti? Stanno collaborando? Si stanno divertendo? ecc.
DIFFICOLTA' O PROBLEMI DI APPRENDIMENTO
Gli studenti stanno avendo difficoltà con il contenuto e / o la tecnologia? Stanno chiedendo supporto? ecc.
OGNI ALTRA COSA CHE RITIENI RILEVANTE

T2. TEACHER'S COMMENTS (in Italian)

T2. COMMENTI DEGLI INSEGNANTI
Durante l'implementazione dell'approccio C4G basato sul gioco sullo sviluppo delle competenze di programmazion, vengono raccolte le opinioni e i commenti degli insegnanti. Per favore, usa questa scheda e indica ciò che hai osservato riguardo gli aspetti indicati precedentemente. Grazie per il tuo tempo e la cooperazione!
INFORMAZIONI GENERALI
Insegnante: _____ Classe: _____ Scuola: _____ Data: _____
RAGGIUNGIMENTO DEGLI OBIETTIVI DI APPRENDIMENTO DA PARTE DEGLI STUDENTI
RILEVANZA ED EFFICACIA DELL'APPRENDIMENTO BASATO SUL GIOCO PER LO SVILUPPO DELLE COMPETENZE DI PROGRAMMAZIONE E DELLO SPECIFICO APPROCCIO DI APPRENDIMENTO *CODING4GIRLS*
GRADIMENTO DELLA METODOLOGIA PROPOSTA DA PARTE DEGLI STUDENTI
DIVERTIMENTO RAGGIUNTO DAGLI STUDENTI

LA TUA OPINIONE IN MERITO ALL'IMPLEMENTAZIONE
USABILITA' E GRADIMENTO DELL'APPROCCIO CODING4GIRLS AL *SERIOUS GAME*
QUALSIASI COSA CHE TU RITIENI RILEVANTE

E. EXPERT'S COMMENTS (in Italian)

E. COMMENTI DEGLI ESPERTI
Dopo l'implementazione dell'approccio C4G basato sul gioco per lo sviluppo delle competenze di programmazione, le opinioni e i commenti verbali degli esperti sono raccolte tramite un'intervista strutturata. Usa questo modulo e indica l'opinione dell'esperto sugli aspetti riportati di seguito
INFORMAZIONI GENERALI
Nome dell'esperto: _____ Posizione: _____ Istituzione: _____ Data: _____
RAGGIUNGIMENTO DEGLI OBIETTIVI DI APPRENDIMENTO DA PARTE DEGLI STUDENTI
RILEVANZA ED EFFICACIA DELL'APPRENDIMENTO BASATO SUL GIOCO PER LO SVILUPPO DELLE COMPETENZE DI PROGRAMMAZIONE E DELLO SPECIFICO APPROCCIO DI APPRENDIMENTO *CODING4GIRLS*
GRADIMENTO DELLA METODOLOGIA PROPOSTA DA PARTE DEGLI STUDENTI
DIVERTIMENTO RAGGIUNTO DAGLI STUDENTI

LA TUA OPINIONE IN MERITO ALL'IMPLEMENTAZIONE DELL'ORGANIZZAZIONE GLOBALE
USABILITA' E GRADIMENTO DELL'APPROCCIO CODING4GIRLS BASATO SUL SERIOUS GAME
QUALSIASI COSA CHE TU RITIENI RILEVANTE

E. PROJECT SUMMARY (in Italian)

Progetto Coding4Girls

Rif. 2018-1-SI01-KA201 -047013

Il progetto CODING4GIRLS affronta il divario esistente tra la partecipazione maschile e femminile all'insegnamento delle scienze informatiche e alle professioni correlate introducendo interventi didattici precoci per rendere l'informatica attraente per tutti.

In questo sforzo i partner di progetto introducono interventi che puntano ai diversi fattori che tengono, in particolare, le ragazze lontano dall'informatica. Il principale obiettivo è di attirare più ragazze verso questo settore rendendole più consapevoli delle ricche opportunità di crescita professionale e personale che vengono offerte per prepararle ad un futuro coinvolgimento nelle professioni correlate.

Il progetto introduce un nuovo approccio pedagogico: il *Design Thinking*. Questo approccio sfida gli studenti e li aiuta a vedere il quadro generale prima di progettare una soluzione dettagliata, li incoraggia a considerare gli interessi della comunità e li sfida a riflettere in modo imprenditoriale sulle tecnologie digitali e su come utilizzarle per affrontare problemi reali.

Sulla base di questo approccio, il team di progetto ha sviluppato un software che consiste in due parti interconnesse. La prima è una piattaforma per gli insegnanti mentre la seconda è un ambiente di gioco per gli studenti (entrambi sono disponibili al link https://www.coding4girls.eu/results_02.php).

Seguendo la metodologia del *Design Thinking*, il team del progetto ha preparato alcuni corsi e scenari di apprendimento progettati per affrontare uno specifico problema di codifica in modo collaborativo e individuale.

I corsi vengono creati da un insegnante sulla piattaforma dedicata e funzionano come uno spazio di raggruppamento per attività correlate. Queste attività sono chiamate sfide che vengono affrontate da ogni studente. Ogni sfida potrebbe avere un mini-gioco a cui lo studente dovrà giocare nel suo ambiente di apprendimento opportunatamente sviluppato, seguendo una pagina con delle istruzioni preparate precedentemente dall'insegnante.

Gli insegnanti interessati, che hanno già esperienza sull'argomento, possono supportare il team di progetto nel processo di convalida del framework di apprendimento proposto utilizzando il software sviluppato per promuovere la progettazione e lo sviluppo di serious game.

Magggiori informazioni:

Sito web di progetto https://www.coding4girls.eu/

F. INSTRUCTIONS TO TEST THE TEACHERS' PLATFORM AND THE STUDENTS' GAME ENVIRONMENT (in Italian)

ISTRUZIONI PER TESTARE LA PIATTAFORMA PER I DOCENTI E IL SOFTWARE DI GIOCO

Il presente documento ha l'obiettivo di supportarvi in questa fase indicandovi le principali attività da svolgere sia per la piattaforma dedicata ai docenti (Fase 1) e sia per l'ambiente di gioco dedicato agli studenti (Fase 2).

Vi consigliamo di:

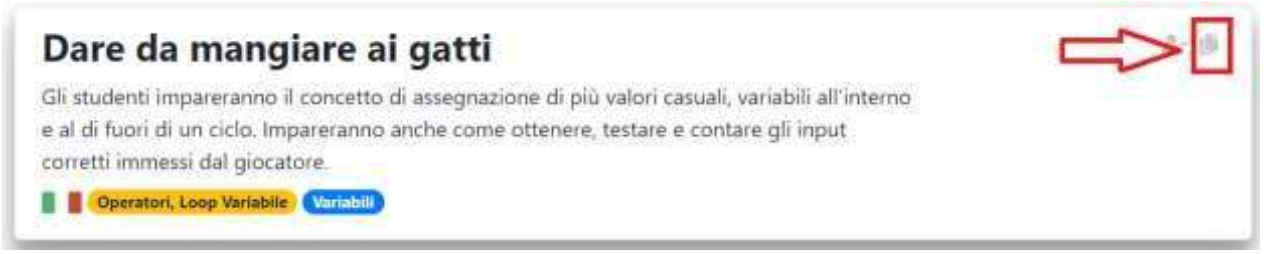
- leggere l'intera guida. È breve ma potresti avere una visione completa del processo;
- visualizzare il video preparato;
- seguire le istruzioni passo dopo passo e portare a termine le attività descritte.
- Inizia dalla piattaforma dedicata ai docenti (Fase 1) e successivamente passa alla Fase 2, poichè le due piattaforme sono interconnesse.
- dopo aver testato ogni strumento, compila il questionario indicato alla fine della presente guida.
- nella guida sono specificate le attività basi per comprendere al meglio le funzionalità di entrambe le piattaforme, ma siete liberi di navigarle e di testarle
- come meglio credete.

FASE 1 - Istruzioni per procedere alla fase di testing della piattaforma dedicata ai docenti:

1. Digitare il seguente link **https://coding4girls.e-ce.uth.gr/#/login**.
2. Scegliere la lingua che preferite dal menu in alto a destra.
3. Iniziate la procedura di registrazione.

Poiché questa è una piattaforma progettata solo per gli insegnanti, gli studenti non possono accedere. Per questo motivo nel momento della registrazione viene chiesto di inserire il codice che fornisce i diritti „insegnante".
Il codice che va inserito è il seguente: **C4G TEACHER**

4. Fate il login.
5. Visualizzate tutti i corsi disponibili nella sezione “Public Courses”/”Corsi Pubblici”.
6. Scegliete un corso e cliccate due volte per aprirlo.
7. Curiosate all’interno del corso scelto, in particolare nelle “impostazioni del corso” e nelle sfide.
8. Ritornate nella sezione “Public Courses”/”Corsi Pubblici”.
9. Cliccate sulla seguente icona per clonare/copiare il corso (per capire meglio le funzionalità del sistema all’interno di un corso già preparato):



10. Visualizzerete la seguente scheda:

11. Cliccate sulla sezione “Corsi” in alto a sinistra per visualizzare il corso clonato.
12. Entrate nel corso clonato, provate a modificare le impostazioni del corso, le sfide esistenti e a crearne una nuova, brainstorming, ecc.

13. Nella sezione “Corsi”, potete provare a creare un corso sul modello dei corsi già creati oppure iscrivervi ad un corso inserendo il codice identificativo di un altro corso già preparato da un altro docente in questa sezione:

Per maggiori informazioni sulle funzionalità e sulla metodologia, visualizzare il seguente video:

https://www.youtube.com/watch?v=TR2cCElhoX8&feature=emb_logo

Il video è in inglese ma sono disponibili i sottotitoli in italiano. Per attivare i sottotitoli in un video pubblicato su Youtube, cliccare sul pulsante indicato dalla freccia rossa.

oppure scaricare Teachers’ Platform – User Manual dal portale:

https://www.coding4girls.eu/results_02.php

Provate ora a sperimentare liberamente!

FASE 2 - Istruzioni per procedere alla fase di testing dell'ambiente di gioco dedicato agli studenti:

1. Scaricare il software da uno di questi link disponibili:

   - Windows: **https://ctll.e-ce.uth.gr/downloads/c4g/launcher/w64/c4g_win.zip**
   - Mac: **https://ctll.e-ce.uth.gr/downloads/c4g/launcher/m64/c4g_m64.zip**
   - Linux: **https://ctll.e-ce.uth.gr/downloads/c4g/launcher/linux/c4g_linux.tar.gz**

2. Seguire le istruzioni date nel seguente video per installare e avviare il software:

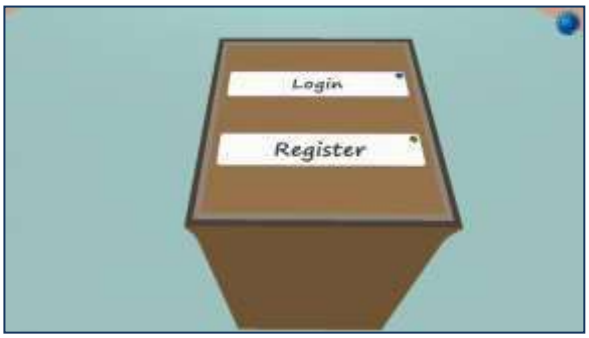
   https://www.youtube.com/watch?v=to6UoJizWVg&feature=emb_logo

Il video è in inglese ma sono disponibili i sottotitoli in italiano. Per attivare i sottotitoli in un video pubblicato su Youtube, cliccare sul pulsante indicato dalla freccia rossa.

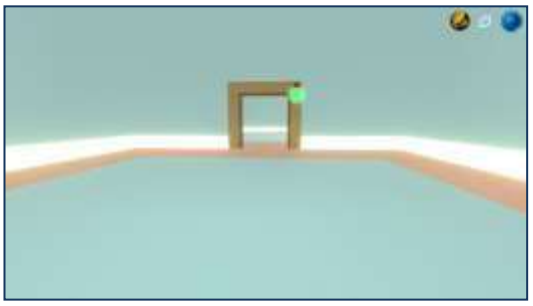
oppure scaricare il documento "Students' Game Environment" – User Manual dal portale:

https://www.coding4girls.eu/results_02.php

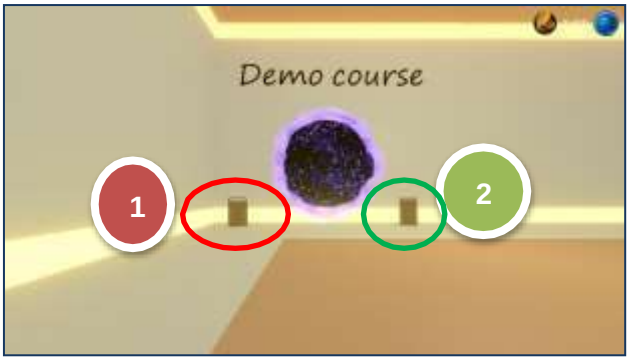
3. Avviato lo *Students' Game Environment*, potete creare nuove credenziali, come se foste uno studente.



4. Dopo il login, cliccate su “Continua” ed entrate nell’altra stanza attraversando la porta di fronte a voi.

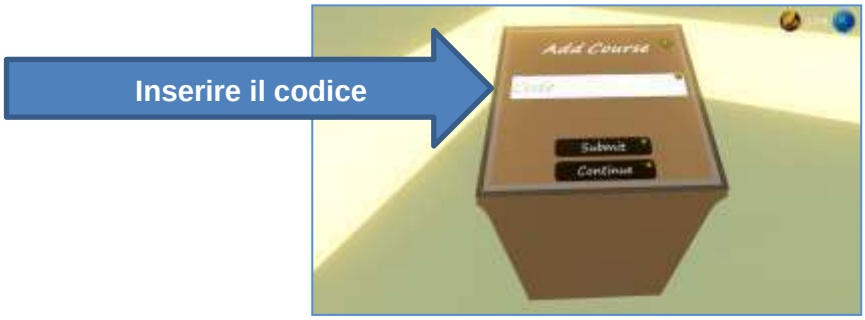


5. E vi ritrovate in questa stanza:



1 Dal terminale sulla sinistra, è possibile aggiungere il codice del corso che l’insegnate ha attribuito al corso creato nella piattaforma dedicata agli insegnanti.

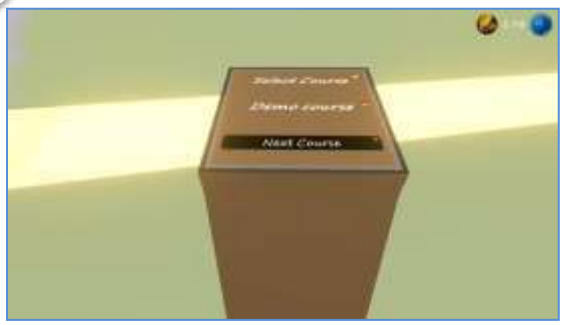
Il codice è quel valore immesso dal docente, vedi pag. 2 della presente guida.



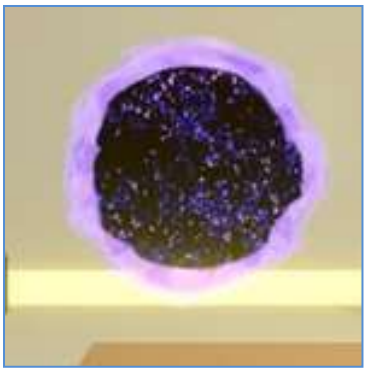
2 Dal terminale sulla destra, è possibile scegliere un corso se si è iscritti a diversi corsi.

Iscriversi ad un corso, vuol dire che è stato già registrato il relativo codice nel terminale.

1



6. Successivamente potete dirigervi verso lo spazio per iniziare le attività:



7. Per maggiori informazioni sulle funzionalità e sui giochi disponibili, visualizzare il seguente video:

https://www.youtube.com/watch?v=to6UoJizWVg&feature=emb_logo

Il video è in inglese ma sono disponibili i sottotitoli in italiano. Per attivare i sottotitoli in un video pubblicato su Youtube, cliccare sul pulsante indicato dalla freccia rossa.

oppure scaricare il documento "Students' Game Environment" – User Manual dal portale:

https://www.coding4girls.eu/results_02.php

8. Per avere un'idea più completa, si possono utilizzare i **corsi** e gli **scenari** di apprendimento **già preparati**.

   I corsi si riferiscono ad un **livello base di coding**.

   Di seguito, viene riportata una tabella con i **titoli dei corsi** e i **codici** corrispondenti sia nella versione **inglese** che in **italiano**:

N.	Corsi in inglese	Codice	Corsi in italiano	Codice
1	**Introduction to Snap! interface**	starting	**Snap!: introduzione**	Primipassi
2	**Discover Snap! : move a spite**	dispubeng	**Scoprire Snap!**	Snap!
3	**Moving around the stage**	monkey	**Muoversi sullo "stage"**	stage
4	**Changing costumes and turning**	Dancer	**Cambiare il costume e creare rotazioni**	ballerina
5	**Sounds of the farm**	farm	**I suoni di una fattoria**	fattoria
6	**Chameleon's summer vacation**	chameleonen g	**Vacanze estive di un Camaleonte**	camaleonte
7	**Helping Prince and Princess to find their animals**	finding	**Alla ricerca degli animali del Principe e della Principessa!**	labirinto
8	**Drawing with a chalk**	chalk	**Disegnare con un gesso**	gesso
9	**Picking up trash and cleaning the park**	cleaning	**Raccogliere la spazzatura e pulire il parco**	spazzatura
10	**Feeding the cats**	feeding	**Dare da mangiare ai gatti**	gatto
11	**Guessing the number of cats in a shelter**	shelter	**Indovinare il numero di gatti in un rifugio**	rifugio

9. Compilare il questionario disponibile al seguente link: https://forms.gle/AAzEM1Qjiq92UG6f8

Grazie per la collaborazione!

Magggiori informazioni:

Sito web di progetto https://www.coding4girls.eu/ Email di contatto – m.tramonti@eu-track.eu

G. TEACHERS' PLATFORM AND STUDENTS' GAME ENVIRONMENT TUTORIAL (in Italian)