

NATIONAL REPORTS - BULGARIA

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INTRODUCTION

BULGARIA

EXECUTIVE SUMMARY

Implementation and validation of the C4G approach in Bulgaria held from February to December 2020 with experts, teachers in Information technology, Informatics and Computer modelling and students age 13-14 from Vocational school of Geodesy, Construction and Architecture, Blagoevgrad. Due to the COVID-19 pandemic, Bulgarian schools were in most of the time closed and face-to-face training activities with the teachers were forbidden. There were some periods for face-to-face activities in September and October 2020 and we use these periods for some of validation activities. The approach was adapted for implementation and use in online environment.

The validation activities were focussed mainly to the teachers and prospective teachers. Students from Master degree program “Technology for education in mathematics and informatics” (Nmst= 15) were involved in the course “Computer games in teaching mathematics and informatics” the course was implemented in blended mode – combination of face-to-face and online activities. Also, after multiplayer event we organised in December 2020 online qualification course for teachers in ICT, Informatics and Computer modelling (Nt=25). The course syllabus was approved by the Faculty council of the Faculty of mathematics and natural sciences at SWU “Neofit Rilski” and gives teachers 2 qualification credits for 16 hours online videoconference meetings and 16 hours for self-preparation and working in on-line environment according to national requirements for teachers’ qualification improvement. One teacher together with member of project team organised validation activities with school students (Ns=39) in Vocational school of Geodesy, Construction and Architecture, Blagoevgrad. In addition, two experts (Ne=2) were invited to validate the approach.

The all activities with teachers and students were based on the C4G methodology and game-based environment developed in the frame of the project.

Results showed that students accepted the game based C4G methodology, participated actively in short workshop and part of them decided to continue with extracurricular activities in programming. Teachers and experts have positive attitude to the proposed methodology and game-based environment.

IMPLEMENTATION

Validation activities

The validation activities in Bulgaria were implemented with:

- personal communication with experts and one teacher, who in the next stage applied the C4G approach with school students. During these personal meetings first were presented ideas of the C4G methodology and after that the game - based environment was introduced;
- blended learning course in area of educational computer games with master degree students (N=15) “Technologies for teaching of mathematics and informatics”. The course was organized in face-to-face classes, on-line videoconference meetings and self-learning in online environment. As a result of this course master students prepared learning scenarios and some of them implemented scenarios in C4G game-based platform.



Fig. 1. Moments from face-to-face workshop with prospective teachers - students in Master degree

- Face-to-face activities with students from one vocational school. In frame of these activities teacher and member of our project team presented and trained the students to use the C4G game based environment for introducing students in programming concepts and engaged them for participation in extracurricular course in digital competences and programming. Information about these presentations were published on the web site of the school - https://www.pgsag-blg.com/?page_id=7

- Online course with teachers from different parts of the country. In this online course participated high motivated teachers in ICT, Informatics and Computer Modelling from Capital city – Sofia, Towns in South-East, Nord-East, South-West and Central parts of Bulgaria (Sofia, Blagoevgrad, Kardzhali, Provadia, Yablanica etc.). Information about this course was announced during multiplayer event at 9.12.2020 and in the Facebook group of teachers in informatics. We organized 16 hours in videoconference environments of MS Teams (this is requirement of the Ministry of Education) and LMS Moodle. All sessions were recorded and published in the LMS Moodle and MS Teams. The course is available in Bulgarian language at

<https://edugames.swu.bg/moodle/course/view.php?id=18>

The image displays two screenshots of a Moodle course page for 'Coding4Girls - ТЕХНОЛОГИИ ЗА ИГРОВО БАЗИРАНО ОБУЧЕНИЕ ПО ПРОГРАМИРАНЕ'. The top screenshot shows the course overview with a sidebar menu containing links like 'Участници', 'Знания', 'Компетенции', 'Оценки', 'Трени', 'Материали от семинар', 'Записи от срещата', 'Материали от 16.12.2020', '18.12.2020', 'Финално задание', and 'Тема 6'. The main content area features a welcome message from the course coordinator, Dr. Daria Todorova, and a list of course materials. The bottom screenshot shows the same course page but with a video recording from MS Teams embedded in the main content area, titled 'Записи от MS Teams - 1'.

Fig.2. Screenshots from the online course in Moodle environment

Data collection tools

During the validation of C4G approach, all the data collection tools provided in the C4G validation strategy were used:

- S1 – Preliminary questionnaire (for students)
- S2 – Follow-up questionnaire (for students)
- T1 – Teacher's observations (one teacher)
- T2 – Teacher's comments
- T2A – Teacher's comments for online course
- E – Expert's comments

The data collection tools were before validation activities translated into the Bulgarian language.

Questionnaires S1 and S2 were paper based, while data collection tools S3, T1, T2, and E for teachers and experts were prepared as Word documents in which they could write observations and comments. Also, for the online course for teachers was developed Google form with extended number of questions.

Materials

During the implementation, learning scenarios and 3D game environment that were developed by the project partners were used, also additional materials have been developed to support activities. All resources were translated in Bulgarian.

Because most of the students have had a low motivation for programming and no previous experience in programming some of topics were presented with aim to increase their motivation. Additional game-course was prepared by teacher and member of project team. The course includes all minigames and initial step in programming with Snap!

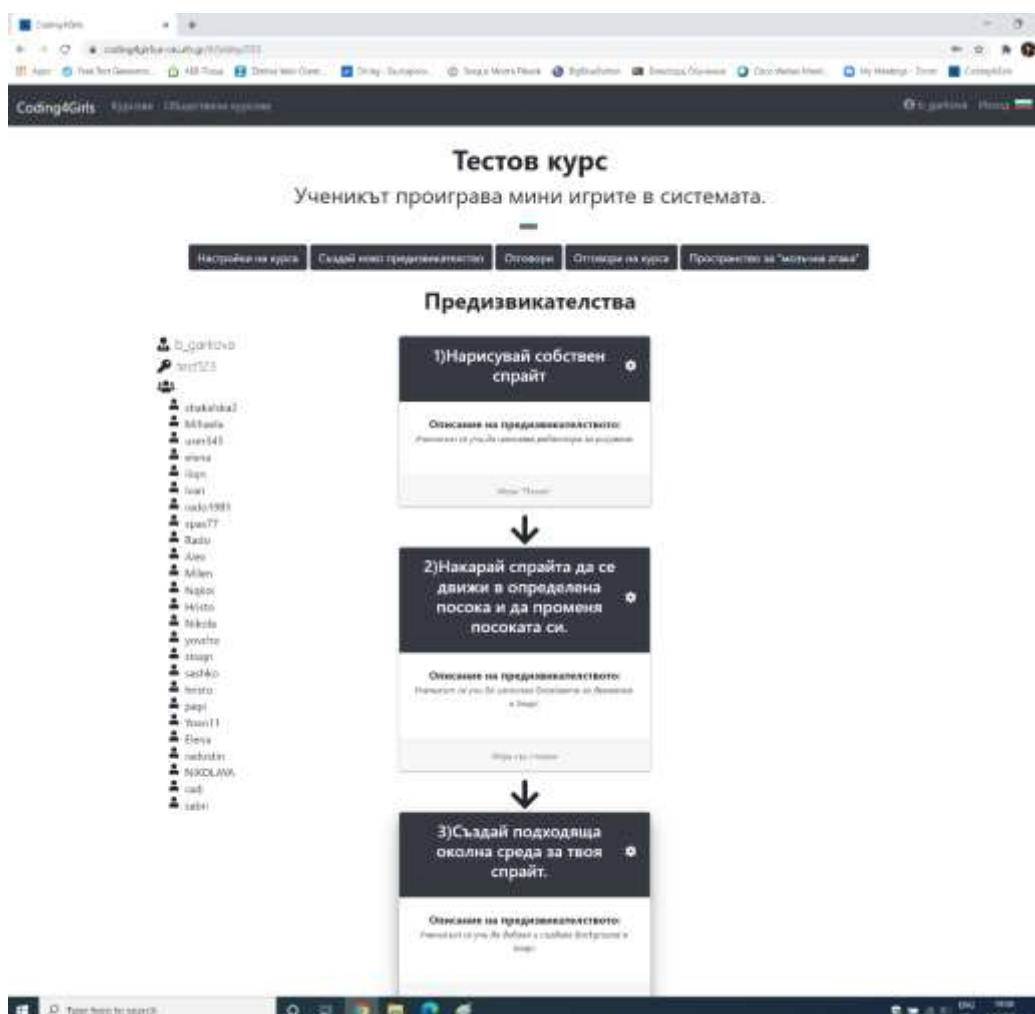


Fig. 3. Screenshot – Teacher's side of the C4G platform with additional course for students

Username	First name	Last name	Challenge name	Level	Solution link
Anna	Anna	Anna	Създай подходяща околна среда за твоя спрайт.	1	Solution
Anna	Anna	Anna	Накарай спрайта да се движи в определена посока и да променя посоката си.	1	Solution
Anna	Anna	Anna	Нарисувай собствен спрайт.	1	Solution
Anna	Anna	Anna	Създай подходяща околна среда за твоя спрайт.	1	Solution
Anna	Anna	Anna	Накарай спрайта да се движи в определена посока и да променя посоката си.	1	Solution
Anna	Anna	Anna	Нарисувай собствен спрайт.	1	Solution
Anna	Anna	Anna	Създай подходяща околна среда за твоя спрайт.	1	Solution
Anna	Anna	Anna	Накарай спрайта да се движи в определена посока и да променя посоката си.	1	Solution
Anna	Anna	Anna	Нарисувай собствен спрайт.	1	Solution
Anna	Anna	Anna	Създай подходяща околна среда за твоя спрайт.	1	Solution
Anna	Anna	Anna	Накарай спрайта да се движи в определена посока и да променя посоката си.	1	Solution
Anna	Anna	Anna	Нарисувай собствен спрайт.	1	Solution
Anna	Anna	Anna	Създай подходяща околна среда за твоя спрайт.	1	Solution
Anna	Anna	Anna	Накарай спрайта да се движи в определена посока и да променя посоката си.	1	Solution
Anna	Anna	Anna	Нарисувай собствен спрайт.	1	Solution
Anna	Anna	Anna	Създай подходяща околна среда за твоя спрайт.	1	Solution

Fig. 4. Screenshot with players of the Test game and results from students' achievements

- Introduction to Snap!
- Discover Snap! : move a sprite
- Moving around the stage
- Changing costumes and turning
- Sounds of the farm
- Chameleon's summer vacation

(The whole activity in Snap! is available at <https://snap.berkeley.edu/snap/snap.html#present:Username=ddureva&ProjectName=Svetofar>)

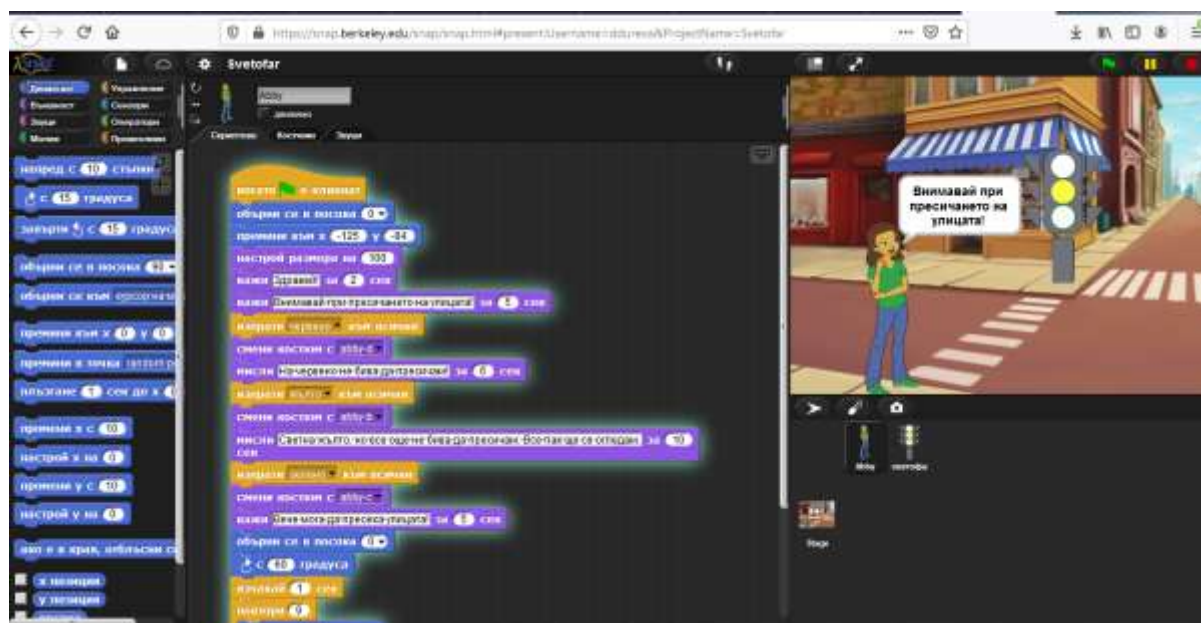


Fig. 5. Traffic Light – story telling

Setup model and procedure

Sessions with students in school were relatively short (about 3 school hours) therefore to engage and motivate students we developed additional game with all

minigames. The teacher was involved in the C4G approach and had previous experience and research activities in area of design thinking methodology.

Before the workshop with the students, teacher conducted survey S1, after the workshop students filled the survey S2. The students were required to write the anonymised code received from the teacher to ensure comparison of results regarding the self-assessment of their programming skill.

Teacher reported the reaction of students and their progress in building coding skills using the game-based C4G approach (T1) and her own views related to the relevance and effectiveness of the CODING4GIRLS game-based learning approach for building programming skills (T2). The teacher participated in the online National Multiplication event and shared her experience and observation during these short workshops with the students.

The first validation workshop with teachers and prospective teachers was implemented in blended mode with Master students. They expressed their opinion regarding C4G approach in T2 in MS Word files. First in face to face mode we presented them the main principles of programming in Snap! All of them had already an experience with Scratch and we compared main futures of both programming environments. After that we involved the teachers in the C4G approach with game – they were in role of students. They played the selected game. During the next face to face session, master students worked together with the project member on development of example game in C4G game-based environment. In the frame of the virtual classrooms and self-learning activities they developed own learning scenarios and games.

After the National multiplier event (December 2020) an online course was implemented with teachers from different part of the country. Some of teachers had experience in block programming environment, some of them were without any experience in block programming environment. In the course teachers were involved in the game-based approach, design thinking ideas and learning framework. Due to different initial programming skills of the teachers, we presented main concepts and blocks in Snap! programming environment. Also because another environments is most used in the schools – Scratch, we compared functionalities of both environments Snap! and Scratch. Teachers were involved in the C4G game-based environment first as a students and after that as a teachers. The next step in the course was to present structure of learning sheets. We used

as an example learning scenario 14. Alice in wonderland. In the last virtual session we prepared together new learning scenario „Traffic light“ which is based on the story telling and broadcasting events. The syllabus of the course and screenshots from the online course are presented in Annexes.

External experts expressed their point of view regarding proposed C4G approach.

Participants

The project team at SWU includes researchers and teachers ($N_{PT}=3$) in the field of game-based learning, programming, didactics of informatics, multimedia and e-learning. All actively involved in the preparation of the implementation and validation activities, including collaborative work with teacher and students and preparing of additional on-line learning materials and virtual workshops.

Direct participant of the study were one teacher in informatics ($N_T=1$), 39 students at 8th grade (14 years old), 18 Master students in program “Technology of education in mathematics and informatics”, 25 teachers – participants in online qualification course and two experts.

The teacher that conducted training with the students has more than 15 years of teaching experience in informatics and research interest to the design thinking and game-based education in informatics. The first expert is senior teacher in informatics at mathematical high school, has more than 20 years of experience in teaching in informatics, participated in group at Ministry of education for development of new curricula in ICT and computer modelling for 5-7th grades. She holds PhD degree (from 2019) and her PhD thesis is related to development of integrative model (based on game development and game-based learning) for teaching programming in secondary school. The second expert has more than 15 years of experience in teaching ICT and is currently part time PhD student at University of Plovdiv with research interests in methodology of game-based education in ICT.

RESULTS

Results of questionnaires for students

According to the accepted validation strategy two questionnaires for students were used: preliminary questionnaire about the use of digital devices and perceived level of programming and 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.

In both questionnaires students were asked to self-assess their current level of programming skill. Based on this question, the difference between students' self-assessed initial and final level of programming skill was calculated (the answers from the questionnaires were paired based on the code that students have entered).

A total of 26 students (66,67% of students who participated in C4G activities) solved both questionnaires. We processed data for students participated in both questionnaires - 26 students (66.67%).

S1 - Preliminary questionnaire

The mean age of students was 13.96 years (SD=0.2041). The number of girls is 5 (19%)

Table 1 shows descriptive statistical analysis of participants' responses to the questions related to the use of digital devices, the internet and video-games. The comparison of the overall average results by gender (Figure 1) shows that boys and girls have been using digital devices for the same length of time. On a weekly basis, girls use digital devices and the Internet more, but boys spend significantly more time playing games.

Table 1 - 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	21	2	11	6,67	2,517
	Girls	5	5	8	6,60	1,140
	Total	26	2	11	6,65	2,297
2. How many hours per week do you use a computer, tablet or other digital device?	Boys	21	5	84	30,43	20,889
	Girls	5	10	105	60,60	43,552
	Total	26	5	105	36,23	28,278
3. How many hours per week do you use the Internet?	Boys	20	3	56	17,85	16,576
	Girls	5	9	95	55,40	41,016
	Total	25	3	95	25,36	27,072
4. How many hours per week do you play video games?	Boys	20	0	74	19,00	19,791
	Girls	5	0	10	2,60	4,219
	Total	25	0	74	15.72	18.918

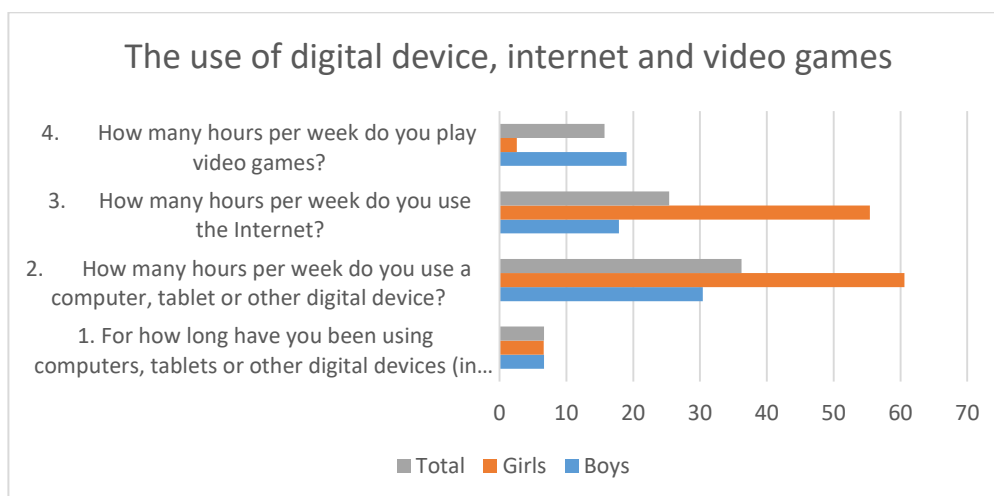


Figure 1 - The use of digital devices, the internet and video-games – comparison by gender

The participants self-assessed the level of their programming skills on the scale 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*. Results are shown in the Table 2. Most of the students stated for themselves that they are at level 0 – novice in programming (50%) and level 1 - *novice programmers* (38.5%). If we compare these results by gender (Figure 2), it can be seen that the boys prevail among the students that self-assess their level of programming with the levels 0 and 1. About 80% of the girls stated that their previous knowledge are at level 1.

Table 2 - Self-assessment of programming skills by gender

Level of programming skills	Boys	Girls	Total
0 - I have never coded or programmed before	61,9%	0	50,0%
1 - I am a novice programmer (just have basic ideas)	28,6%	80%	38,5%
2 - I can code simple programs	0%	0%	0%
3 - I am fluent in programming (can create a full program)	9,5%	20%	11.5%
4 - I can design a solution of a problem in the form of a program	0%	0%	0%

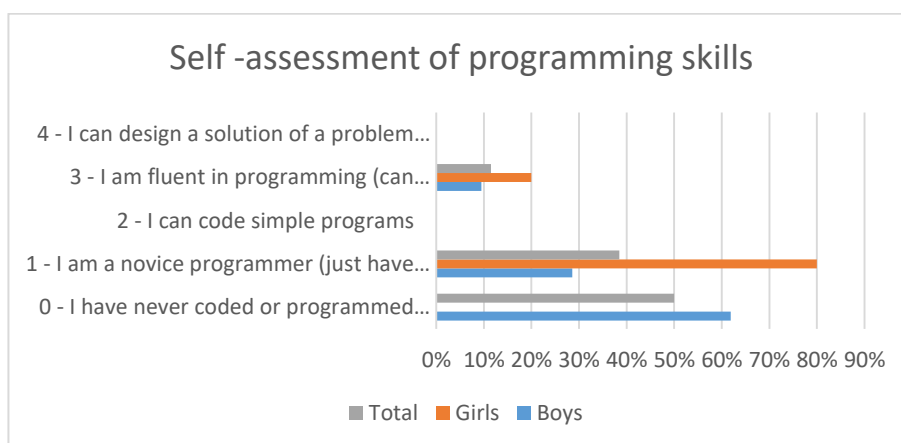


Figure 2 - Self-assessment of programming skills – comparison by gender

In the preliminary questionnaire the participants also stated which programming concepts are they familiar with. The results (Table 3) show that students are mostly familiar with the *events* (26,9%) and *operators* (19,2%) while they are the least familiar with the *loops* (3,8%) and *parallelism* (7,7%). According to the results, there is difference in familiarity of programming concepts between the genders (Figure 3). The largest difference in percentages can be observed for the concept *operators*. But due to small numbers of girls it is possible that there is no statistically significant difference in ratios for girls and boys. Additional analysis is needed.

Table 3 - Familiarity with the programming concepts

Concept	Boys	Girls	Total
Loops	4,8%	0%	3,8%
Conditionals	9,5%	40%	15,4%
Variables	14,3%	20%	15,4%
Statements (sounds, movement, looks, drawing)	4,3%	40%	11,5%
Operators	14,3%	40%	19,2%
Events	19%	60%	26,9%
Parallelism	4,8%	20%	7,7%

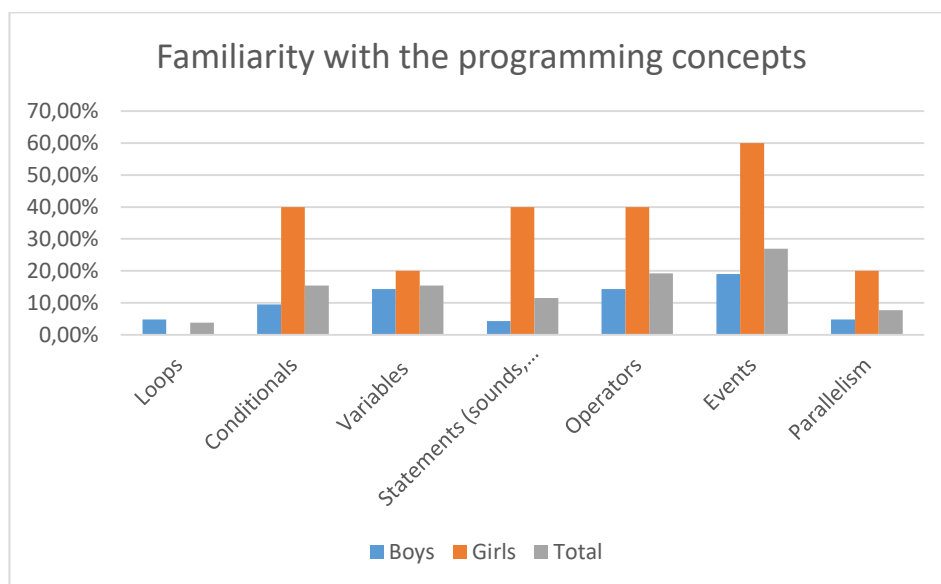


Figure 3 - Familiarity with the programming concepts – comparison by gender

Comparison of motivations by gender (Table 4) shows that about 40% of boys and girls are low motivated. Girls are not impressed to have carrier in programming, but they wish to show to others that they can program. We have to take into account that girls are only 5.

Table 4 - Motivation for learning programming by grade and gender

Statement	Boys	Girls	Total
I'm not motivated	38,1%	40%	38,5%
I want to succeed in the programming class	28,6%	0%	23,1%
I want to show other students I can program	9,5%	40%	15,4%
I want to follow a career in programming	14,3	0%	11,5%
I enjoy solving logic problems and puzzles	19%	0%	15,4%

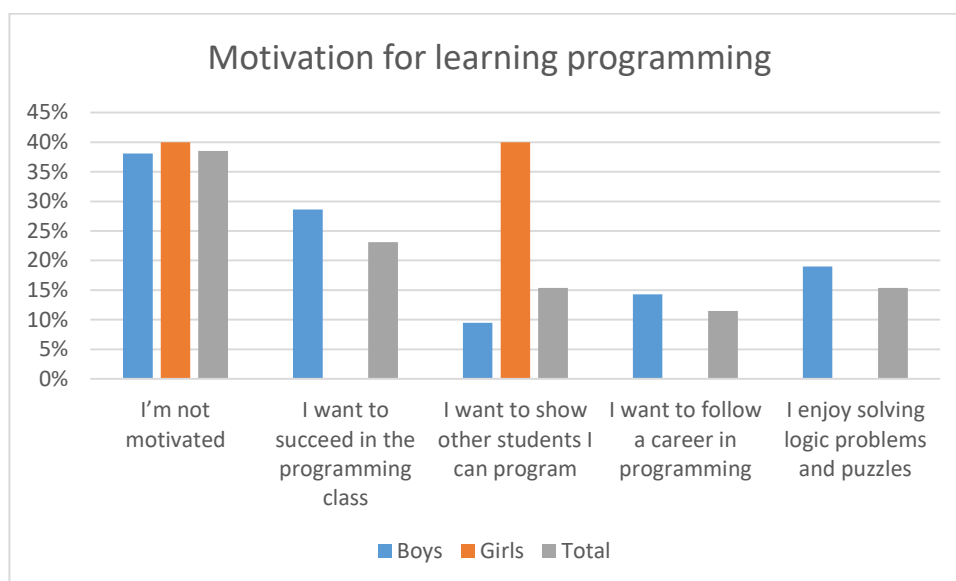


Figure 4 - Motivation for learning programming – Comparison by gender

S2 – Follow-up questionnaire

A total of 26 students 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 students are the same that filled S1 questionnaire.

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). According to the results (Table 5.), both boys and girls felt engaged with this way of learning and think that conducted activities were relevant for learning programming. The short time of workshop did not give them to understand all concepts in programming. But they find that learning programming in this way is fun. Girls find that programming is easy. Both groups boys and girls confirm that learned material will be helpful for their future.

Table 51 – Satisfaction with C4G learning methodology

Statement		1	2	3	4	5	Mean	Median	SD
1. I found programming challenging.	Boys	9,5	14,3	19,0	42,9	14,3	3,38	4	1,203
	Girls	0	20	40	40	0	3,2	3	0,837
	Total	7,7	15,4	23,1	42,3	11,5	3,35	4	1,129
2. I found programming motivating.	Boys	23,8	14,3	28,6	28,6	4,8	2,7	3	1,153
	Girls	0	40	20	40	0	3	3	1,000

	Total	19,2	19,2	26,9	30,8	3,8	2,81	3	1,201
3. I found programming easy.	Boys	9,5	33,3	28,6	19,0	9,5	2,86	3	1,153
	Girls	0	20	20	60	0	3,40	4	0,894
	Total	7,7	30,8	26,9	26,9	7,7	2,96	3	1,13
4. I enjoyed programming.	Boys	9,5	14,3	19,0	38,1	19,0	3,43	4	1,248
	Girls	0	0	40	60	0	3,60	4	0,548
	Total	7,7	11,5	23,1	42,3	15,4	3,46	4	1,140
5. I understood most of programming concepts.	Boys	19,0	38,1	19,0	19,0	4,8	2,52	2	1,167
	Girls	0	80	0	20	0	2,40	2	0,894
	Total	15,4	46,2	15,4	19,2	3,8	2,50	2	1,105
6. Learning this way is fun.	Boys	19,0	0,0	14,3	42,9	23,8	3,52	4	1,401
	Girls	0	0	40	40	20	3,80	4	0,837
	Total	15,4	0	19,2	42,3	23,1	3,58	4	1,301
7. I felt engaged with this way of learning.	Boys	23,8	23,8	23,8	23,8	4,8	2,62	3	1,244
	Girls	0	60	20	20	0	2,60	2	0,894
	Total	19,2	30,8	23,1	23,1	3,8	2,62	2,50	1,169
8. The activities were relevant to learn.	Boys	0	4,8	38,1	28,6	28,6	3,81	4	,928
	Girls	0	20	40	40	0	3,20	3,00	0,837
	Total	0	7,7	38,5	30,9	23,1	3,69	4	,928
9. At any time, it was clear what I had to do.	Boys	0	14,3	38,1	38,1	9,5	3,43	3	,870
	Girls	0	40	20	40	0	3	3	1
	Total	0	19,2	34,6	38,5	7,7	3,35	3	0,892
10. What I learned will be relevant for my future.	Boys	0	9,5	28,6	23,8	38,1	3,90	4	1,044
	Girls	20	0	0	60	20	3,60	4	1,517
	Total	3,8	7,7	23,1	30,8	34,6	3,85	4	1,120

The students again self-assessed the level of their programming skills on the scale 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*. A total of 26 students (21 boys, 5 girls) solved the preliminary and the follow-up questionnaire so their self-assessment results were compared. Because the workshops with the students were too short, we can not to expect achievements of higher results and changes in self-assessment of programming skills. All girls do not state changes in their level of programming skills. Only two boys (9,5%) indicate changes in their programming skills with one level up.

A Wilcoxon's signed rank test for paired samples showed that students self-assessed their programming skill are the same as before short workshop activities. significantly higher after the C4G activities compared to self-assessment before the C4G activities (Table 6). The effect size is calculated with formula $r = \frac{Z}{\sqrt{n}}$, where Z is z- statistics obtained from Wilcoxon signed rank test (SPSS), n is number of observations.

Table 6 - Comparison of self-assessment of programming skill

		Descriptive statistics					Wilcoxon's signed rank test results		
		N	MIN	MAX	MEAN	SD	Z	p	Effect size
Boys	S1	21	0	3	.57	.926	-1,414	0,500 (exact sig. 0,500)	.309
	S2	21	0	4	.67	1.065			
Girls	S1	5	1	3	1.4	.894	0	1.0 (exact sig. 2-tiled)	.0
	S2	5	1	3	2.4	.894			
Total	S1	26	0	3	.73	.962	-1.414	0,500 (exact sig. 0,500)	.277
	S2	26	1	4	.81	1.059			

Students' comments

Nevertheless, that there were no changes in self-assessment of programming skills students were impressed by the proposed approach and as a result of this short workshops half of them decide to start participation in extracurricular course in programming.

Teachers' observations and comments

After the implementation activities, teachers and students – future teachers were asked to express their qualitative opinions about the C4G methodology and the implementation process using the forms T1 and T2.

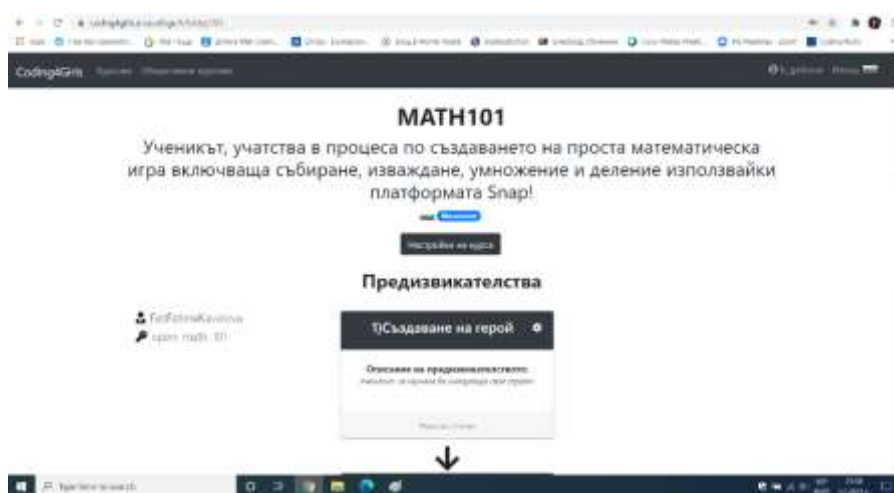
Teachers' observations

The teacher that implemented C4G approach reported: “The students quickly navigated the platform, it was fun and interesting, they helped each other and competed with each other. The students did not encounter any special difficulties in working with the platform, they sought help in performing some tasks set by the teacher. It is very useful to have a textbook for using the programming training platform, as well as a teacher's book with methodological guidance and tasks and scenarios.” Also, in discussions with the teacher about positive and negative side of Snap! usage, she comment that less features of the Snap! in comparison with Scratch, regarding the integrated graphical editor, gives opportunities to the students to extend their skills in searching, finding and processing external images from internet space and take care about copyrights of the used pictures.

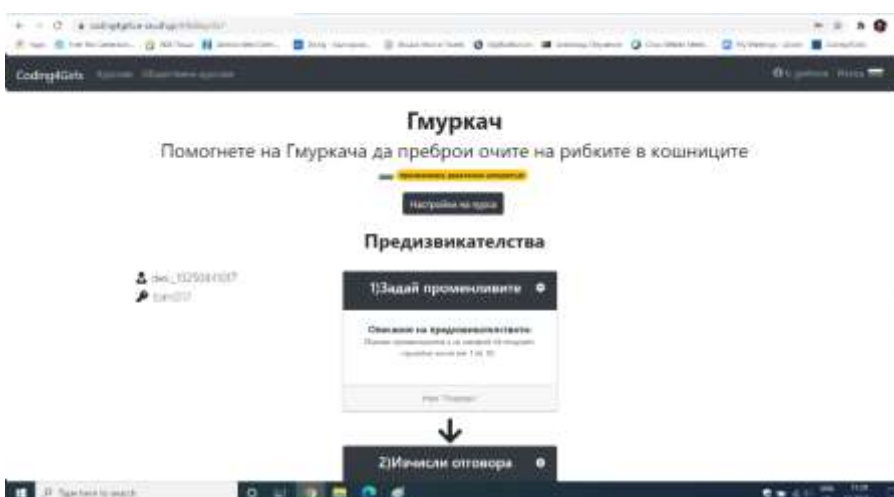
The future teachers from master's degree programme in their answers of the questions in form T2 (11 from 15) stated their attitude to the C4G method. Most of them mentioned that the use of games in education aims to make the learning content much more accessible and understandable for students and at the same time to strengthen children's interest in the discipline. Students will be engaged in the games and for them it will be fun. The approach is relevant to the new school curricula in ICT. They evaluate positively teachers' and students' materials published on the web site of the project – videos, learning sheets with scenarios. Tree of master's degree students (one of them is teacher in Informatics) commented that in the beginning it will be interesting for the students, but it will be difficult to confirm that this interest will be sustainable. They also comment that approach requires a lot of time to prepare games and to be implement in the class. The platform works slowly and requires high parameters of the used computer system.

The master's degree students developed additional scenarios according the C4G methodology and some of them were implemented in the C4G game platform. Some example of these games are given in Fig. 10. The games are:

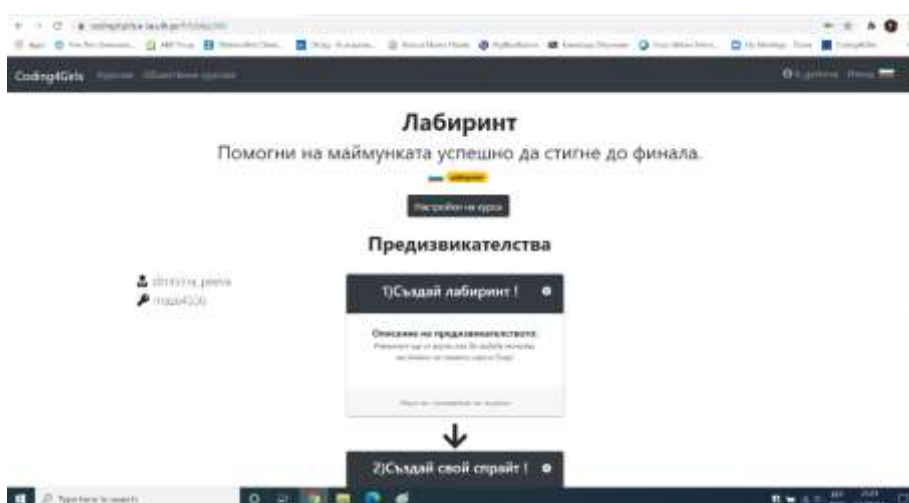
- Fun math – access code open_math_101;
- Diver with access code – tomi017;
- Maze – access code maze4556.



Course Math 101



Course Diver



Course Maze

Fig. 10 Games created by the master degree students in C4G platform – teacher side

Teachers from online qualification course developed 17 learning scenarios with possibilities for integration with different school subjects – physics, maths etc.

They filled online questionnaire based on the T2 with some changes in type of questions. Results from the questionnaire are presented in the Fig.11Fig. The colours in the chart mean as follows: (Definitely yes – blue colour, Yes – red colour, Not – orange colour and Definitely not – green colour).

All teachers have positive perceptions about proposed C4G approach. They confirm that approach is effective to achievement of learning objectives, effective for building programming skills, easy of use learning material for the students. The teachers will apply the platform and methodology of the Coding4girls project in their teaching practice. Only one of them answered that will not use the game-based platform.

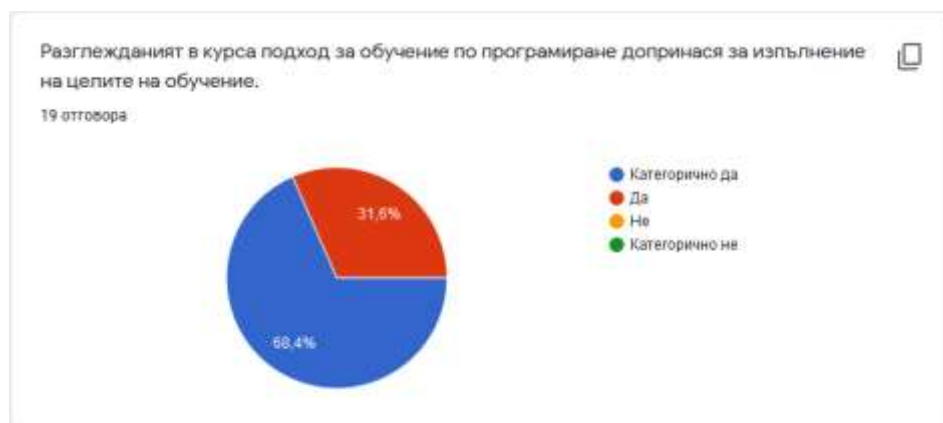


Fig. 11. The proposed approach for learning programming adds value to achieve learning objectives

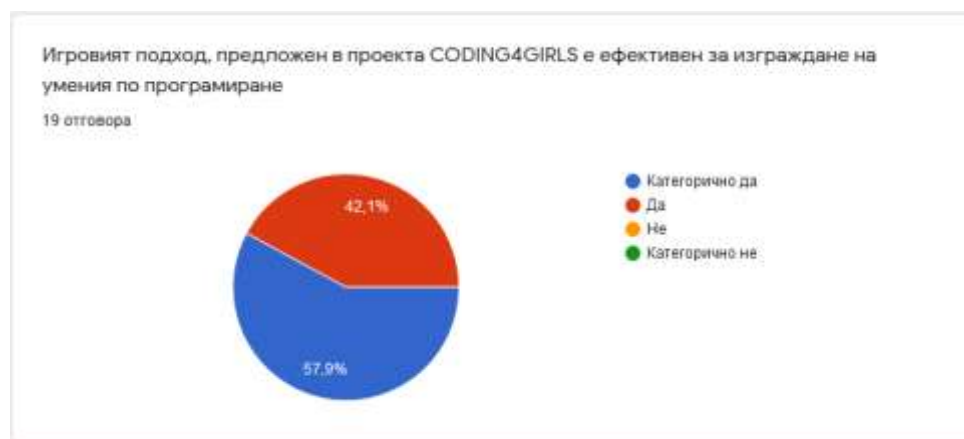


Fig. 12. Answers of the statement: the game-based approach in Coding4Girls is effective for development of programming skills.



Fig. 13. Proposed methodology gives possibilities for easy understanding of learning material



Fig. 14. For the students it will be fun to use this approach



Fig.15. Would you like to apply this approach in your school practice



Fig. 16. Would you like to use the game platform developed in the frame of the project Coding4Girls?

We also asked teachers how many hours they spend for development of learning scenario and game in the platform in case they have developed the game. Average time for development of scenario – 11,5 hours (STD- 16,51) and 4,7 hours for development of the game (STD – 3,26). The process is estimated as high time consuming for development of scenarios and game in C4G game environment. Of course, it will depend from the experience and skills of the teacher.

The teachers gave high grade of the organisation of the online course, learning materials and the used teaching approaches.

Regarding usability teachers confirm that approach is useful and effective. Some of them mentioned that C4G game-based platform requires to high parameters of the computer system, that in some cases is till not available for some schools and the system works slowly.

Some materials developed by the teachers are presented in Annex J.

Experts' comments

External validators - experts ($N_E=2$) were also asked to give their qualitative opinions regarding the accomplishment of learning objectives by the students, relevance, effectiveness and acceptance of the proposed methodology by the students, and the overall organization of the implementation.

They agree that for developing basic programming skills for students from 10-16 years, the C4G methodology is suitable. The methodology for learning scenarios is adaptable to different block programming environments and it is possible easy to transfer scenarios from Snap! to Scratch. (Scratch is most used programming environment in Bulgarian primary schools.) “Although very different from the traditional methodology for working in programming classes, the proposed methodology is very well precepted by the students and they quickly will orientate themselves in the new situation. Today's students are a generation that grew up with various computer games. The C4Girls platform for learners did not turn out to be something scary and difficult to work with, on the contrary - another game (challenge) to learn to play.” The platform and the proposed methodology can be used both for the acquisition of new knowledge and for the consolidation of already studied material. Developed project platform requires the presence of computers with very good technical performance. This poses some barriers to the implementation of the approach in schools, where technology is often obsolete. Also, the platform will be more engaged for girls if in the beginning the rooms are decorated in suitable interior. The approach of combining game environment for engagement of the students and learning programming through game development is very appropriate for the students in age 10-16.

DISCUSSION AND CONCLUSIONS

The results from students’ opinion and teacher observation show that students accept well an approach as fun environment for building programming skills. But to achieve results in programming they need more time for using of environment and more classes with collaboration with classmates and teacher.

After the training activities, teachers and prospective teachers stated that proposed conducted activities will enable students to achieve learning outcomes and at the same time had fun. Some of master students (3) are not so satisfied about sustainable effect of the proposed approach and platform. Teachers think that C4G approach is effective, fun and useful for development of programming skills. They intend to apply approach in their future work with the context of new school curricula in ICT and Computer modelling in 5-7th grade. This curriculum will start from 2021/2022 school year and contains topics related to

programming. In 5th grade programming in block based environment will continue with development of games and use of subprograms and lists. In 6th and 7th grades students will move from block-based programming to text-based programming in JavaScript or Python. Teachers will decide about used programming language and environment. The combination of design thinking and game-based approach for building programming skills is very suitable for the students. The approach is time consuming for the teachers if they decide to develop own scenarios and games according to needs and previous skill of the students. But the developed in the frame of the project learning materials will help them to apply proposed methodology and to attract the programming to the wide number of students.

Teachers and experts well evaluate fact that platform gives the teacher possibility to adapt existing games to curricula and students' needs. Teachers also and experts stated that platform requires high computer systems parameters and, in some schools, will be difficult to implement successfully the environment.

Experts suggest being improved the design of "interior" of the entrance room and lobby of the environment.

In conclusion the C4G methodology is appropriate for students who are 10 – 16 years old and enable the achievement of learning outcomes in an effective and fun way, it is adaptable according curricula, students' needs and interests. Most of schools use Scratch instead Snap! and in new Bulgarian curricula in ICT and programming will be introduced JavaScript or Python. Therefore, enlargement of the platform towards the Scratch, JavaScript and Python will be very useful.

Acknowledgments: we thanks to all participants in the validation study of the C4G methodology and game environment and colleagues from Croatia project team for the proposed report template. This report is based on the template of Croatian National validation report and in some paragraphs are used relevant texts from it.

ANNEXES

A. S1. PRELIMINARY QUESTIONNAIRE FOR STUDENTS (in Bulgarian)

S1. ПРЕДВАРИТЕЛЕН ВЪПРОСНИК ЗА УЧЕНИЦИ	
<p>Тази анкета представлява предварително проучване за използването на цифрови устройства и опит в програмирането, проведено в рамките на проекта CODING4GIRLS, който има за цел да разработи игрови подход за изграждане на умения за програмиране.</p> <p>Вашите отговори ще бъдат анонимни и ще се използват само с изследователски цели. Благодарим Ви за отделеното време и съдействие!</p> <p>Моля напишете кода, получен от вашия учител по-долу.</p>	
КОД И ОСНОВНА ИНФОРМАЦИЯ	
Код: _____	Училище: _____
Възраст: _____	Клас: _____
Пол: М Ж	
УПОТРЕБА НА ДИГИТАЛНИ УСТРОЙСТВА, ИНТЕРНЕТ И ВИДЕОИГРИ	
От колко време използвате компютри, таблети или други цифрови устройства?	_____ години
Колко часа на седмица използвате вашите компютри, таблети или други дигитални технологии?	_____ часа
Колко часа на седмица сърфирате в Интернет?	_____ часа
Колко часа на седмица играете видеоигри?	_____ часа
ОПИТ В ПРОГРАМИРАНЕТО	
<p>Какво е вашето ниво на програмиране сега? <i>Закръглете най-подходящия отговор.</i></p> <p>Никога преди не съм програмирал.</p> <p>Аз съм начинаещ програмист (имам основни познания).</p> <p>Мога да пиша леки програми.</p> <p>Влада свободно програмирането (мога да създам пълна програма).</p> <p>Мога да проектирам решение на даден проблем под формата на програма.</p>	
<p>Ако вече сте изучавали програмиране, коя от следните концепции ви е позната?</p> <p><i>Отбележете един или повече отговори.</i></p>	

Цикли	Променливи	Събития
Условия	Оператори	Паралелност
Представяне (звук, движение, изглед, рисуване)		
<p>Какво Ви мотивира да се научите да програмирате? <i>Изберете едно или повече.</i></p> <p>Не съм мотивиран</p> <p>Искам да успея в курса по програмиране</p> <p>Искам да покажа на съучениците си, че се справям добре</p> <p>Искам да работя, като програмист</p> <p>Интересно ми е, да решавам логически задачи и пъзели</p> <p>Друго _____</p>		

B. S2. FOLLOW-UP QUESTIONNAIRE FOR STUDENTS (in Bulgarian)

S2. ПОСЛЕДВАЩО ПРОУЧВАНЕ ЗА УЧЕНИЦИ					
<p>Това е последващо проучване за удовлетвореността от C4G подхода за обучение и изпълнението на дейности за придобиване на умения за програмиране.</p> <p>Вашите отговори ще бъдат анонимни и ще се използват само за изследователски цели. Благодарим ви за отделеното време и съдействие!</p> <p>Моля, напишете по-долу кода получен от вашия учител (това е същият код, който сте използвали в предварителния въпросник).</p>					
КОД И ОСНОВНА ИНФОРМАЦИЯ					
Код:	_____		Училище:	_____	
Възраст:	_____		Клас:	_____	
Пол:	<div style="display: flex; justify-content: space-around; width: 100%;"> М Ж </div>				
C4G МЕТОДОЛОГИЯ ЗА ОБУЧЕНИЕ					
Класифицирайте следните твърдения:	<i>Напълно несъгласен</i>	<i>Несъгласен</i>	<i>Нямам мнение</i>	<i>Съгласен</i>	<i>Напълно съгласен</i>
Програмирането за мен е предизвикателство.	1	2	3	4	5
Мотивиран съм да програмирам.	1	2	3	4	5
Считам програмирането за лесно.	1	2	3	4	5
Приятно ми е да програмирам.	1	2	3	4	5
Разбирам повечето от програмите концепции.	1	2	3	4	5
Обучението по този начин е забавно.	1	2	3	4	5
Почувствах се ангажиран с този начин на обучение.	1	2	3	4	5
Дейностите бяха добре подбрани.	1	2	3	4	5
По всяко време беше ясно какво	1	2	3	4	5

трябва да направя.

Това, което научих, ще ми бъде
полезно за в бъдеще.

1	2	3	4	5
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ВЪЗПРИЕТО НИВО НА ПРОГРАМИРАНЕ

Какво е вашето ниво на програмиране? *Закръглете най-подходящия отговор.*

Никога преди не съм програмирал

Аз съм начинаещ в програмирането (имам основна представа)

Мога да пиша лесни програми

Владея свободно програмирането (мога да създам пълна програма)

Мога да проектирам решение на проблем под формата на програма

УДОБСТВО НА ИГРОВАТА СРЕДА

Класифицирайте следните твърдения:	Напълно несъгласен	Несъгласен	Нямам мнение	Съгласен	Напълно съгласен
Бих искал да използвам тази игра по-често.	1	2	3	4	5
Намирам играта за сложна.	1	2	3	4	5
Играта беше лесна.	1	2	3	4	5
Имам нужда от помощ за да използвам тази игра.	1	2	3	4	5
Различните функции в играта бяха добре интегрирани.	1	2	3	4	5
В тази игра имаше твърде много непоследователност.	1	2	3	4	5
Повечето хора много бързо биха се научили да използват тази игра.	1	2	3	4	5
Играта беше много тромава.	1	2	3	4	5
Чувствах се уверен, докато играя.	1	2	3	4	5

Трябваше да науча много неща, преди да мога да започна да играя тази игра.	1	2	3	4	5
ОПИТ В ИГРИТЕ					
Класифицирайте следните твърдения:	<i>Напълно несъгласен</i>	<i>Несъгласен</i>	<i>Нямам мнение</i>	<i>Съгласен</i>	<i>Напълно съгласен</i>
Чувствах се доволен.	1	2	3	4	5
Чувствах се сръчен.	1	2	3	4	5
Заинтересувах се от играта.	1	2	3	4	5
Мислех, че е забавно.	1	2	3	4	5
Бях напълно зает с играта.	1	2	3	4	5
Чувствах се щастлив.	1	2	3	4	5
Играта ми развали настроението.	1	2	3	4	5
Мислех за други неща.	1	2	3	4	5
Изморително е.	1	2	3	4	5
Чувствах се достатъчно компетентен.	1	2	3	4	5
Мислех, че е трудно.	1	2	3	4	5
Беше естетически приятно.	1	2	3	4	5
Забравих за всичко около мен.	1	2	3	4	5
Чувствах се добре.	1	2	3	4	5
Бях добър/а в това.	1	2	3	4	5
Бях отегчен.	1	2	3	4	5
Чувствах се успешен.	1	2	3	4	5
Проявих въображение.	1	2	3	4	5
Чувствах, че мога да изследвам нещата.	1	2	3	4	5

Забавлявах се.	1	2	3	4	5
Бързо постигнах целите на играта.	1	2	3	4	5
Чувствах се раздразнен.	1	2	3	4	5
Чувствах се притиснат.	1	2	3	4	5
Чувствах се раздразнително.	1	2	3	4	5
Изгубих представа за времето.	1	2	3	4	5
Беше едно предизвикателство.	1	2	3	4	5
Чувствах се предизвикан.	1	2	3	4	5
Бях дълбоко концентриран в играта.	1	2	3	4	5
Чувствах се разочарован.	1	2	3	4	5
Чувствах се с богат опит.	1	2	3	4	5
Загубих връзка с външния свят.	1	2	3	4	5
Усетих натиск във времето.	1	2	3	4	5
Трябваше да положа много усилия за това.	1	2	3	4	5

C. S3. STUDENT'S COMMENTS (in Bulgarian)

S3. МНЕНИЕ НА УЧЕНИЦИ	
<p>След прилагането на C4G подхода за изграждане на умения по програмиране, учителите събират мнения и коментари от учениците в групова анкета и ги обобщават. Моля, групирайте учениците и съберете техните мнения и коментари, като използвате този формуляр.</p> <p>Благодарим ви за отделеното време и съдействие!</p>	
ОСНОВНА ИНФОРМАЦИЯ	
Учител: _____	Клас: _____
Училище: _____	Дата: _____
ОБЩА ОРГАНИЗАЦИЯ И ВЪЗПРИЯТИЕ ОТ УЧЕНИЦИТЕ	
<p><i>Бихте могли да попитате учениците за мнението им относно цялостната организация, придобитите знания, тяхното възприятие за уместността и ефективността на обучението, основано на игри и постигнатото забавление.</i></p>	
ТРУДНОСТИ ПРИ ОБУЧЕНИЕТО	
<p><i>Бихте могли да попитате учениците за всякакви затруднения или проблеми, с които са се сблъскали по време на курса и каква е била реакцията им, откривайки тези проблеми.</i></p>	
МНЕНИЕ НА УЧЕНИЦИТЕ ЗА ТОВА КАК ДА СЕ ПОДОБРЯТ МЕТОДОЛОГИЯТА, ИНСТРУМЕНТИТЕ И СЪДЪРЖАНИЕТО НА C4G.	
ВСИЧКО, КОЕТО СЧИТАТЕ ЗА ПОЛЕЗНО	

D. T1. TEACHER'S OBSERVATIONS (in Bulgarian)

T1. НАБЛЮДЕНИЯ НА УЧИТЕЛЯ	
<p>По време на изпълнение на задачите, учителите наблюдават и документират реакцията на учениците и техния напредък в изграждането на умения по програмиране, използвайки игрови-базирания C4G подход.</p> <p>Моля, използвайте този формуляр и посочете вашите наблюдения относно изброените по-долу аспекти.</p> <p>Благодарим ви за отделеното време и съдействие!</p>	
ОСНОВНА ИНФОРМАЦИЯ	
Учител: _____	Клас: _____
Училище: _____	Дати (от - до): _____
УЧАСТИЕ И ЗАИНТЕРЕСОВАНOST НА УЧЕНИЦИТЕ	
<p><i>Вземат ли активно участие в обучението? Сътрудничат ли си? Забавляват ли се? и т.н.</i></p>	
ТРУДНОСТИ И ПРОБЛЕМИ ПРИ ОБУЧЕНИЕТО	
<p><i>Срещат ли трудности със съдържанието и/или технологията? Имат ли нужда от помощ при работата в платформата? и т.н.</i></p>	
ВСИЧКО ДРУГО, КОЕТО СЧИТАТЕ ЗА ПОЛЕЗНО	

E. T2. TEACHER'S COMMENTS (in Bulgarian)

T2.2 АНКЕТА ЗА УЧИТЕЛИ
<p>Събират се мнения и коментари на учителите относно C4G подхода, основан на играта за изграждане на умения по програмиране.</p> <p>Моля, използвайте този формуляр и споделете вашето мнение по изброените по-долу аспекти.</p> <p>Благодарим ви за отделеното време и съдействие!</p>
ОСНОВНА ИНФОРМАЦИЯ
<p>Учител: _____ Дата: _____</p> <p>Училище: _____</p>
ПРИНОС НА C4G ПОДХОДА ЗА ИЗПЪЛНЕНИЕ НА ПОТЕНЦИАЛНИТЕ ЦЕЛИ НА ОБУЧЕНИЕТО
ЕФЕКТИВНОСТ И АКТУАЛНОСТ НА ИГРОВИЯ ПОДХОД ПРЕДЛОЖЕН В ПРОЕКТА CODING4GIRLS ЗА ИЗГРАЖДАНЕ НА УМЕНИЯ ПО ПРОГРАМИРАНЕ

ВЪЗМОЖНОСТИ ЗА ВЪЗПРИЕМАНЕ НА ПРЕДЛОЖЕНАТА МЕТОДОЛОГИЯ ОТ УЧЕНИЦИТЕ

ЗАБАВНО ЛИ ЩЕ Е ЗА УЧЕНИЦИТЕ ДА ИЗПОЛЗВАТ ТОЗИ ПОДХОД?

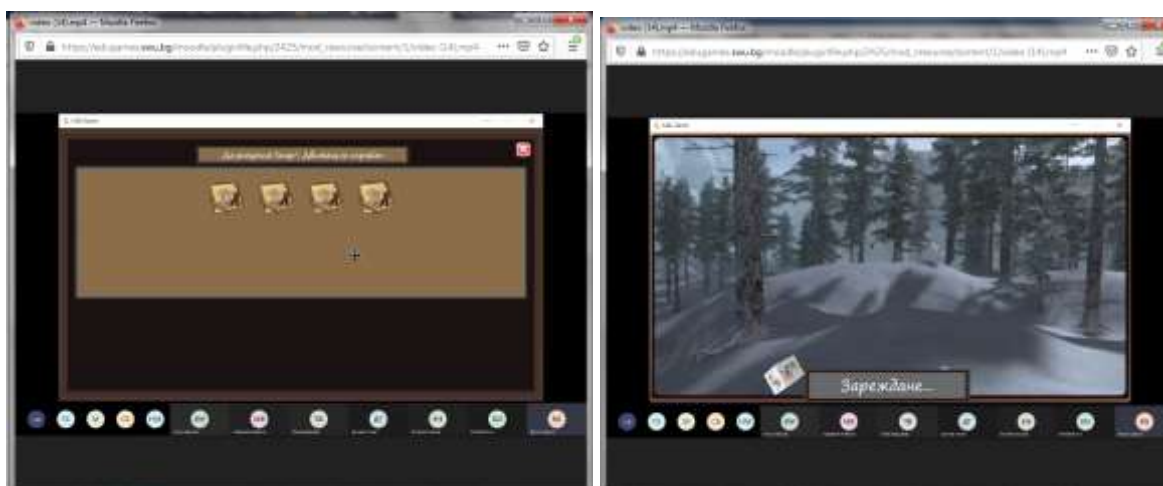
ВАШЕТО МНЕНИЕ ЗА ОБЩАТА ОРГАНИЗАЦИЯ НА ОБУЧЕНИЕТО НА УЧИТЕЛИ

ПОЛЗВАЕМОСТ И ВЪЗПРИЕМАНЕ НА ПОДХОДА CODING4GIRLS ЗА ОБУЧЕНИЕ ЧРЕЗ СЕРИОЗНИ ИГРИ (комбинация на дизайн мислене, игрови подход, образователна рамка)
КОМЕНТАРИ, КОИТО СЧИТАТЕ ЗА ПОЛЕЗНИ

F. EXPERT'S COMMENTS (in Croatian)

E. Коментари на експерти	
<p>След внедряване на игрово-базиран C4G за изграждане на умения за програмиране, вербалните качествени мнения и коментари на експертите се събират в структурирано интервю.</p> <p>Моля, използвайте този формуляр и посочете експертно мнение по изброените по-долу аспекти.</p>	
GENERAL INFORMATION	
Име: _____	Позиция: _____
Институция: _____	Дата: _____
Изпълнение целите на обучение от учениците	
Съответствие и ефективност игрово базираното обучение за изграждане на умения за програмиране предложен в проекта Coding4Girls	
Възприемане на предложената методология от учениците	

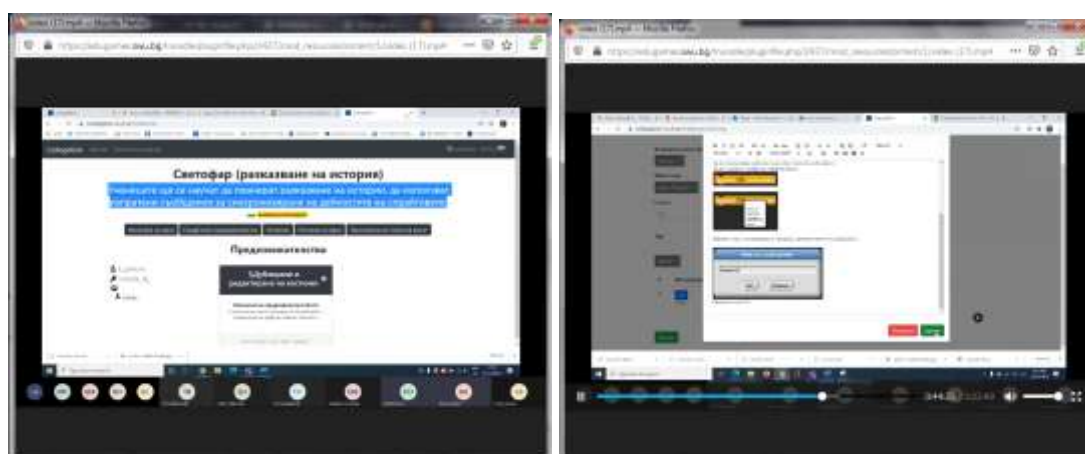
Постигане забавление от учениците
Вашето общо мнение за цялостната организация при реализация на подхода
Ползваемост и възприемане на концепцията на подхода базиран на сериозни игри (свързан с CODING4GIRLS игрови подход, дизайн мислене и образователна рамка)
Всяко нещо, което смятате че е подходящо да коментирате.



Presentations of mini games in the C4G platform



Development of scenario in learning sheet for the topic Traffic Light



Development of game Traffic Light in the C4G environment

H. Syllabus for teachers' qualification course



SOUTH-WEST UNIVERSITY "NEOFIT RILSKI"

BLAGOEVGRAD

Approved by:

Dean of FMNS: / Assoc. Prof. El. Каращранова, PhD /

S Y L L A B U S

for a qualification course for teachers

GAME-BASED PROGRAMMING TRAINING TECHNOLOGIES

CODING4GIRLS PROJECT

Period of Tuition:	32 hours
Form of Tuition:	Partial on-site attendance/distance
Tuition-Providing Faculty:	Faculty of Mathematics and Natural Sciences (FMNS)
Tuition-Providing Department:	Informatics (in FMNS)

BLAGOEVGRAD

2020 г.

Syllabus

The syllabus and the teaching and learning materials were designed within the Coding4Girls project, co-financed together with ERASMUS+, KA201

Name of Programme
GAME-BASED CODING INSTRUCTION TECHNOLOGIES

Programme Target: (more than one type of educationalists can be chosen)	
X	Teachers – primary school
X	Teachers – lower-secondary school
X	Teachers – upper-secondary school
	Head-teachers
	Deputy Head-teachers
X	Head of ICT Sector
	Pedagogical consultants, psychologists
	Pedagogical staff in dormitories
	Speech therapists, rehabilitators, resource teachers
	Répétiteur, choreographers, coaches
	Other (please specify)

Syllabus annotation
Brief description:
<p>The course is designed to target teachers of computer modelling at primary level, IT teachers at lower-secondary level, and IT and Informatics teachers at upper-secondary level, as well as head of ICT sector. Course graduates will be able to organise successfully digital competences development classes within the framework of the <i>Education for Tomorrow</i> project and other extracurricular activities in the field of teaching programming.</p> <p>The syllabus includes the following key topics:</p>

1. Fundamental concepts – serious games, game-based learning, design thinking, learning theories and their association with serious games.
2. Game environments for the teaching of programming. Overview.
3. Snap! block environment for programming. Major characteristics and blocks. Introducing basic structures through computer games design.
4. Game environment for programming, designed through the *Coding4girls* project. Teacher interface and student interface. Application of the environment in the process of acquiring new content and skills, digital competences evaluation, independent studies.
5. Creating learning scenarios for teaching coding to children through computer games.

The form of tuition is partial attendance – 16 classes of attendance is required, as well as 16 classes if distance education in the form of webinars and independent assignments. Practice sessions involve group work and production of resource materials. Should attendance at the university is impossible (in accordance with instructions of the Ministry of Education and Science /MES/), classes will be held in the form of synchronous learning through synchronous distance learning technologies: on-line videoconference platforms.

Aims and Objectives:

The tuition will result in improving the trainees' knowledge and skills in:

Academic competence:

- Knowledge in the sphere of the teaching and learning in computer modeling and coding, as well as coding teaching methodology. (1.1.)
- Evaluation of digital competencies through contemporary means and technologies (1.2.)
- Development of communicative skills, critical and design thinking for the purpose of efficient search, deduction and selection of information from a variety of sources. (1.7)

Pedagogical competence:

- Planning of activities, in the sphere of extracurricular education in coding (1.1)
- Realization of disciplinary and interdisciplinary connections, forecasting of the expected learning outcomes. (1.2)
- Application of innovative methods for teaching and evaluating students' results. (1.5)
- Supporting and motivating students in the formation of digital skills (2.4)
- Implementing the requirements for safe learning, education and work conditions and providing students with a safe and secure environment, including work on the Internet (2.10)

- Using innovative methods and tools to promote student progress. (3.2)

Administrative competence

- Organization of coding training in a game environment.

Methods of teaching:

The following training methods will be applied:

Lecture, discussion, group work, independent assignment.

Material, technical and information resources specific to the program:

Laptop, video projector, screen, internet access, computer room with internet access for students, e-learning platform Moodle, online video conferencing environment, study materials: user guides, videos, sample lesson scenarios, developed within the Coding4Girls project.

Relationship between the theoretical and practical parts:

Theoretical part - 30%, practical part - 70%

Competencies to be acquired:

(one may choose one or more types of competencies)

X	Academic
X	Pedagogical
	Organisational
	Communicative
X	Administrative

Forms of tuition:

	On-site attendance
X	Distance
X	Partial on-site attendance

Duration of tuition:

(number of classes)

32 (16 on-site attendance and 16 distance education)

Number of qualification credit points: (number of points)
2 credit points

Final evaluation (elective):	
X	Defending a lesson project
	Test
	Presentation
	Other(please, specify):
	Methodological case-study

Trainers included in the program: (list the names and PIN of the trainers)
Daniela Ivanova Tuparova Boyana Garkova Rositsa Georgieva

Contact person:	
Name:	Daniela Ivanova Tuparova
Current address (by ID card):	
Tel:	
E-mail:	ddureva@swu.bg

Blagoevgrad

Lecturer:

2020 r.

/ Prof. Daniela Tuparova, PhD /

The syllabus was discussed and approved by the Department Council of the Department of Informatics on protocol №

Head of Department:

/Assoc. Prof. Stefan Stefanov, PhD/

The syllabus was approved by the Faculty Council of the Faculty of Natural Sciences and Mathematics on; protocol No....

I. Some materials developed by teachers – scenario and games

Project “Clean the Seabed” by Elena Garbacheva

“This is a lesson scenario in which students will learn to use variables. They will also consolidate their previous knowledge and skills.

I created a game that is now public and available in Snap !. The octopus moves with the help of arrows.

The link to the game is:

<https://snap.berkeley.edu/project?user=elenagmg&project=Sea-floor-end>

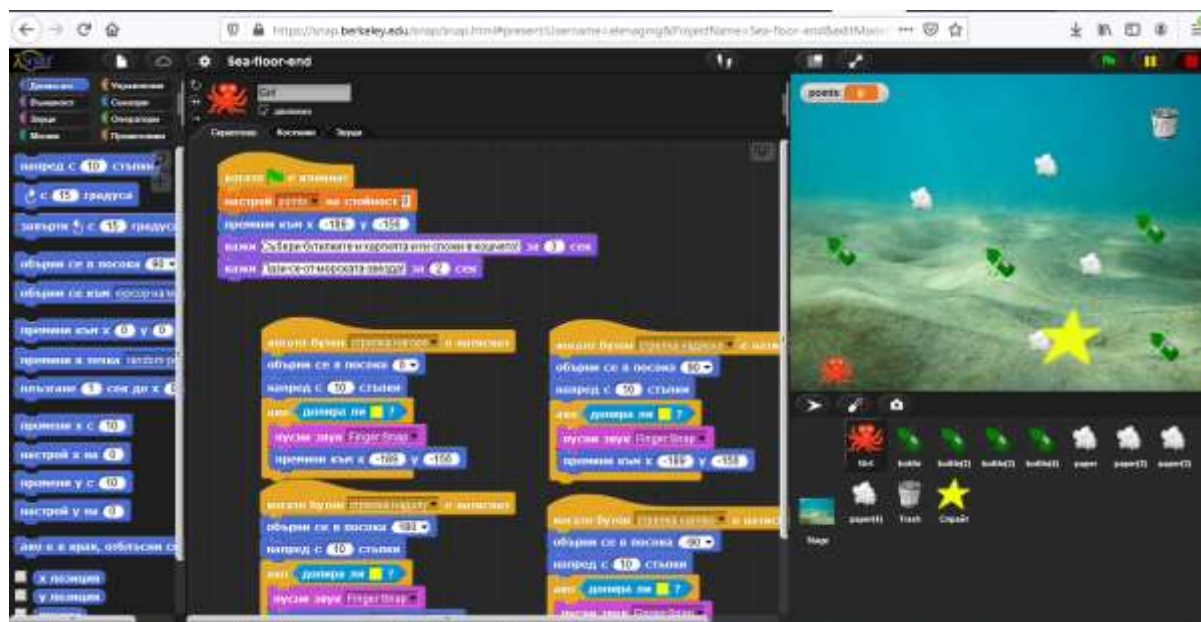
After collecting all the garbage, the octopus should go to the trash.

Of course, garbage collection is not an easy task, so there is a sprite - a star that returns the octopus to its starting position.

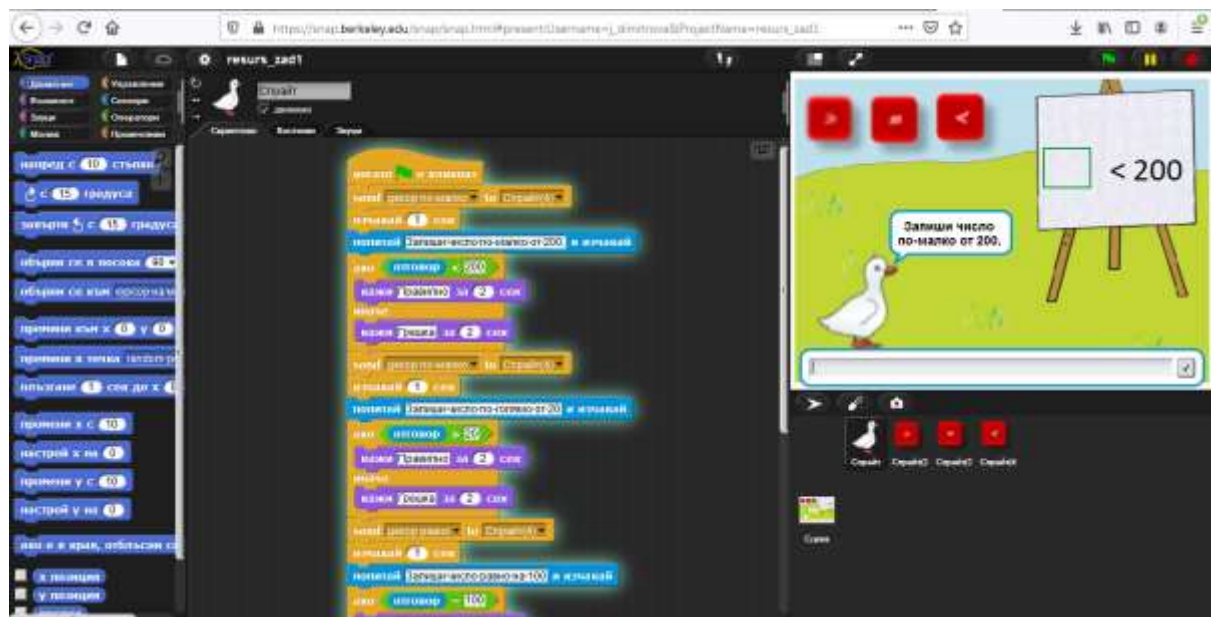
The collected garbage is counted and this number is stored in a variable.

The course I created on the Coding4Girls platform is called **"Clean the Seabed."**

The code for it is: **sea_bed**

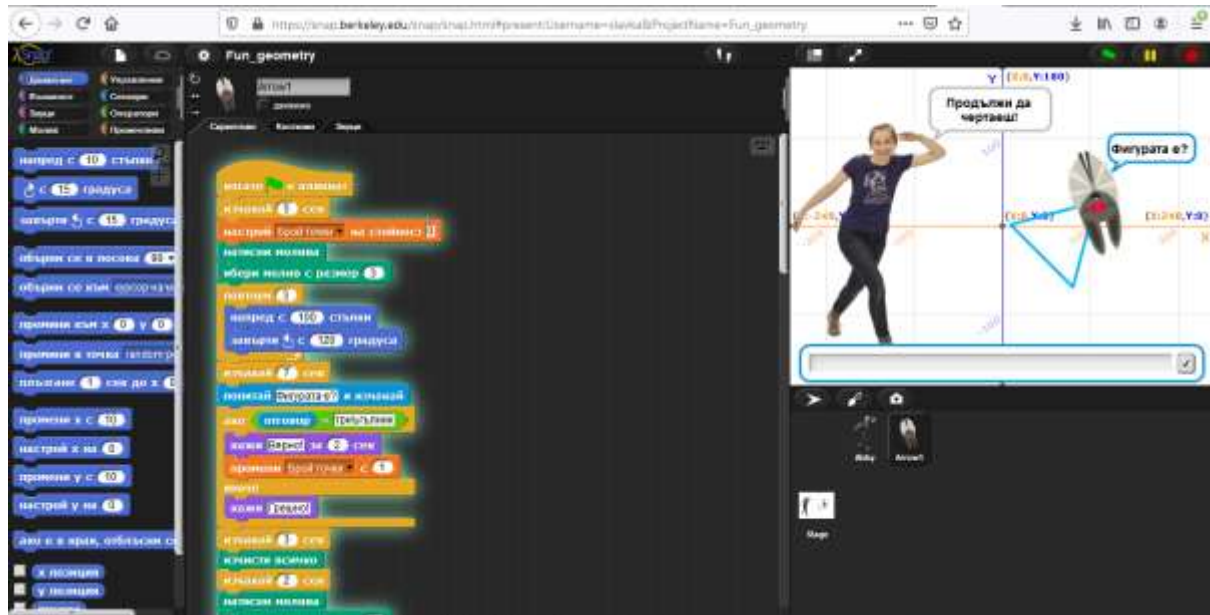


Game for checking knowledge about numbers.



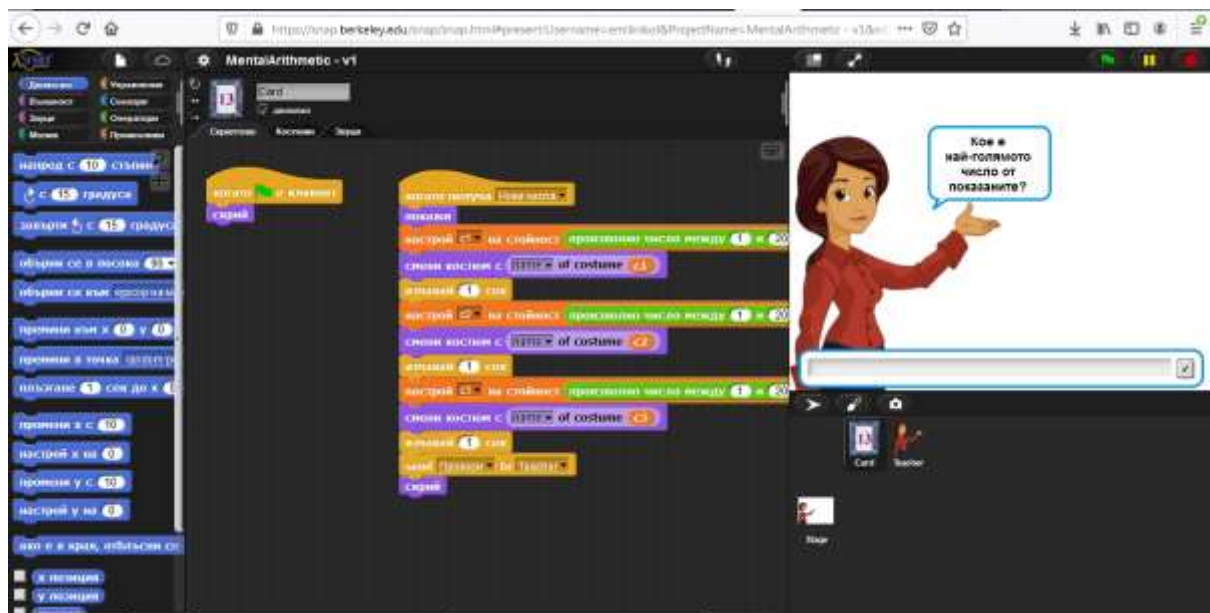
The screenshot shows a web browser window with the address bar displaying a URL from bekekas.ydu. The main content area shows a Scratch project titled "Презентация". The project is a presentation about the number 234/2. It features a character pointing at a whiteboard with the text "На колесо в равно 234/2". The code is written in Russian and uses Scratch blocks to calculate the result of the division.

Fun geometry by Slavka Baleva



https://snap.berkeley.edu/snap/snap.html#present:Username=slavka&ProjectName=Fun_geometry

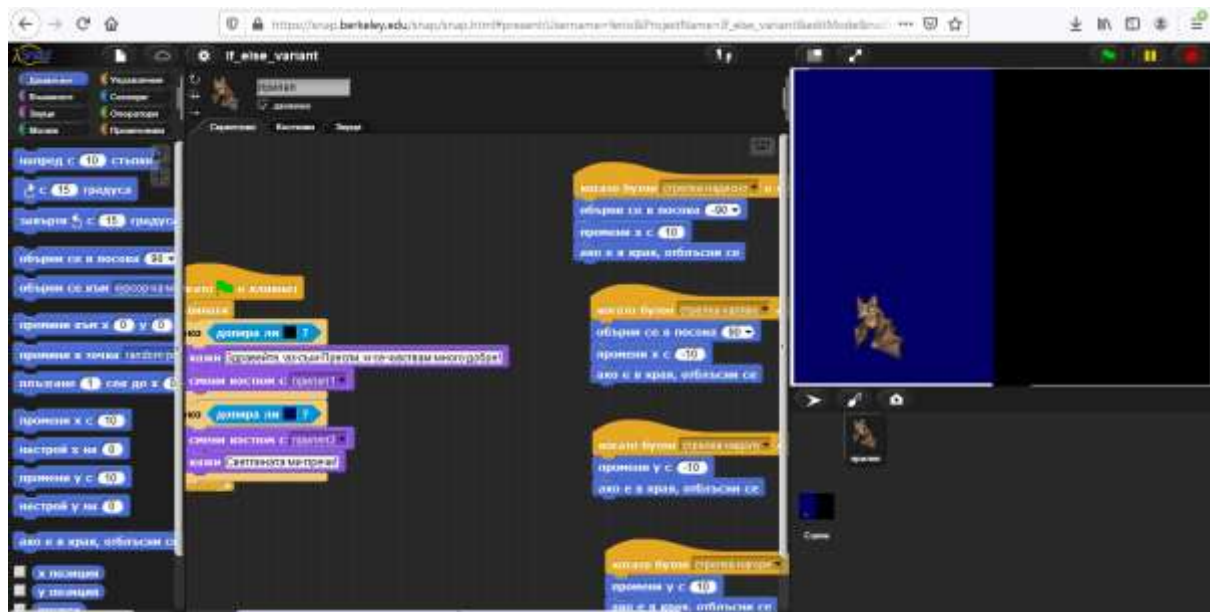
Mental arithmetic by Emilia Nikolova



<https://snap.berkeley.edu/project?user=emilnikol&project=MentalArithmetic%20-%20v1>

The live of the Bat – Margarita Velikova

The game is like the Live of Chameleon, but it is simple and involves if else constructions and sensors.



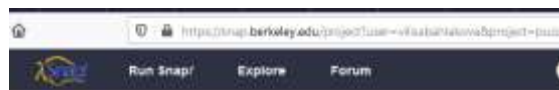
https://snap.berkeley.edu/project?user=fenix&project=If_else_variant

Game with ball by Valentina Simeonova, Ljuben Simeonov



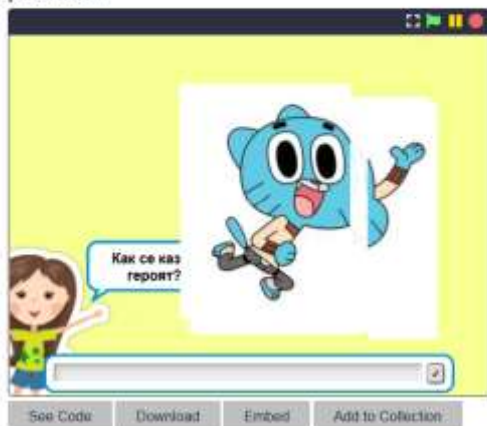
https://snap.berkeley.edu/snap/snap.html#present:Username=valia_sim&ProjectName=Igra%20na%20topka-Final&editMode&noRun

Order the jigsaw by Velichka Sabahlakova

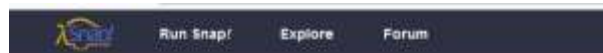


<https://snap.berkeley.edu/project?user=vilisabahlakova&project=puzzle1>

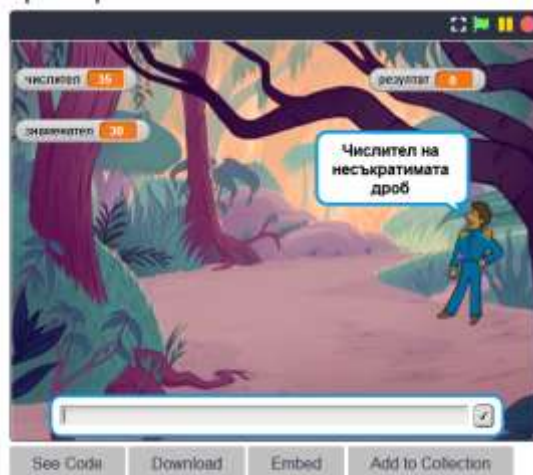
puzzle1



Fractions in mathematics by Muharem Mollov

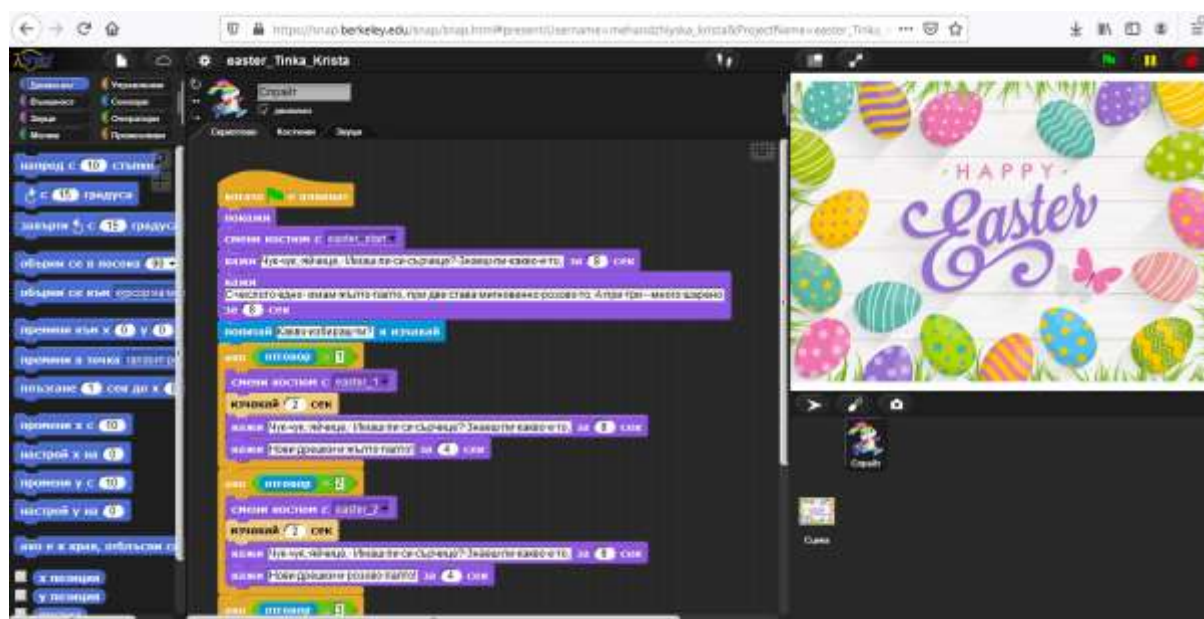


Съкращаване на дроби – игра за тренировка



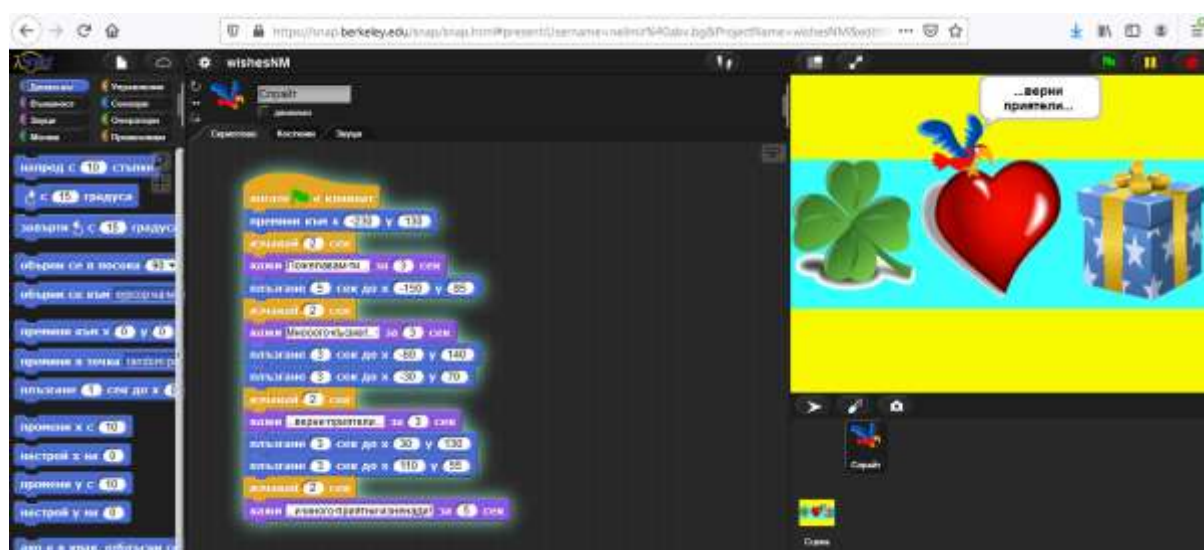
<https://snap.berkeley.edu/project?user=mohym&project=%D0%A1%D1%8A%D0%BA%D1%80%D0%B0%D1%89%D0%B0%D0%B2%D0%B0%D0%BD%D0%B5%20%D0%BD%D0%B0%20%D0%B4%D1%80%D0%BE%D0%B1%D0%B8%20%E2%80%93%D0%B8%D0%B3%D1%80%D0%B0%20%D0%B7%D0%B0%20%D1%82%D1%80%D0%B5%D0%BD%D0%B8%D1%80%D0%BE%D0%B2%D0%BA%D0%B0>

Happy Easter – Story telling by Krista Mehandzhijka and Tinka Prokopova



Story – Happy Easter

Celebrations by Nely Mircheva



<https://snap.berkeley.edu/project?user=nelimir%40abv.bg&project=wishesNM>

Course in C4G game platform: „Празнични поздравления“

Access code: wishes_nm

Game Ballet by Rositsa Georgieva

На сцената се появява водещ, който представя балетна танцьорка. Тя излиза на сцената и танцува под звуците на музика.

5. **CG Gene**

Изборите подготвувача сума и термин за балетните представления (сума, модац и темп, ор)



Накарайте стройтът „Бидец“ да излезе на сцената и да представи танцора. Може да използвате този ход.

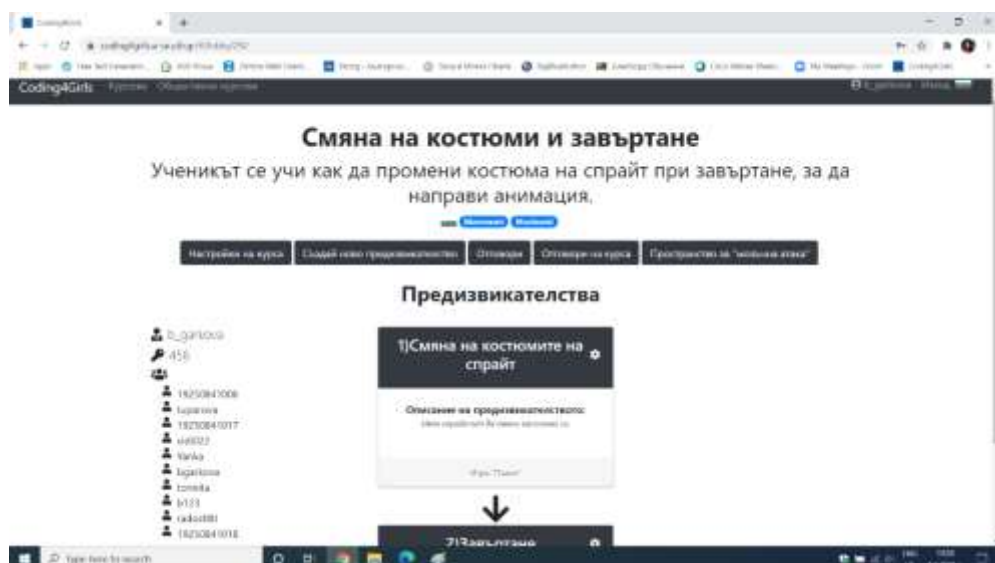
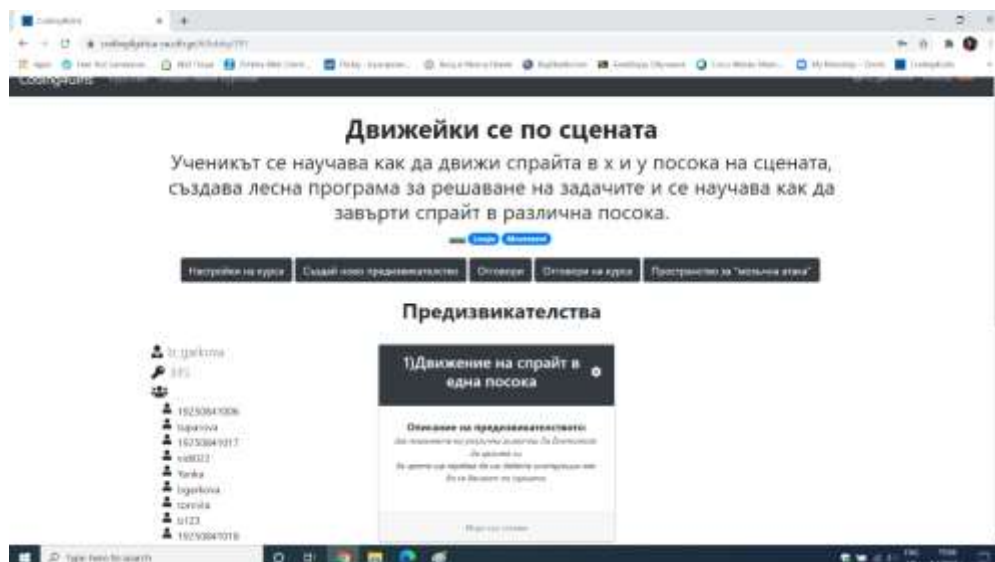
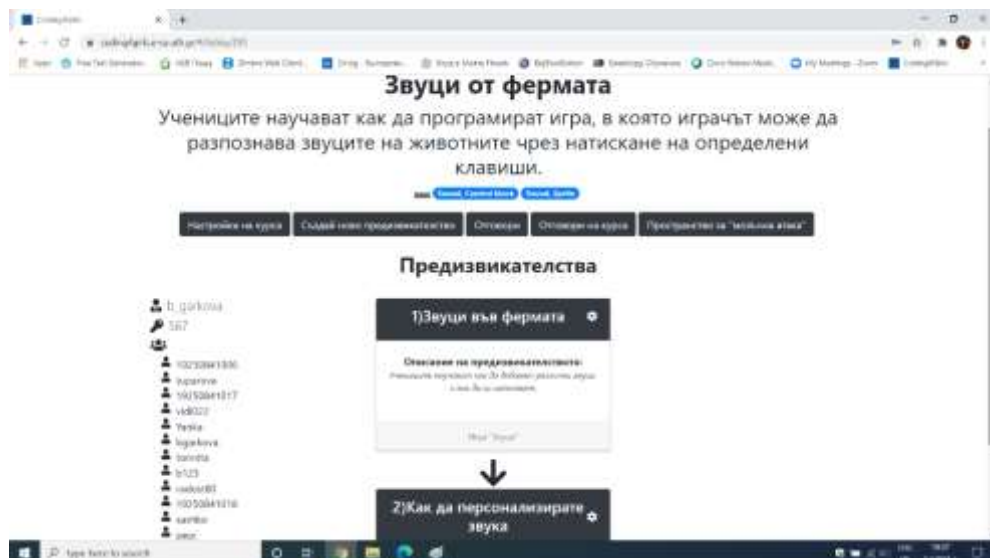
```
set score to 0
show 000000
change score by 1
give 1 coin to a 100 y. 0
switch to costume: get number
say [amount of coins you have is 1000000] for 2 secs
```







J. Screenshots from courses used in training of master students



Да разучим Snap!: Движещ се спрайт

Помогнете на учениците да разучат интерфейса на Snap! и да съставят код за първия им спрайт, така че той да се движи и говори.

Настройки на курса Създай нов предизвикателство Отговори Отговори на курса Пространство за "малката атака"

Предизвикателства

1) Движение на спрайт

Описание на предизвикателството: Използвайте новия механизъм "Движение на спрайт" и го изтрийте.

Иван "Томас"

↓

Увод в Snap!

Ученикът добавя нов спрайт, добавя костюм към спрайта, редактира костюма и изтрива едно от двете. Ученикът създава нов фон на сцената, редактира го и го изтрива.

Настройки на курса Създай нов предизвикателство Отговори Отговори на курса Пространство за "малката атака"

Предизвикателства

1) Пробвайте свой блок!

Описание на предизвикателството: Използвайте нов механизъм "Блок" и го изтрийте.

Иван "Томас"

↓

2) Създайте свой спрайт!

game

Лятната ваканция на хамелеона

Програмирайте проста игра в която обект да променя костюма си в зависимост от цвета на фона.

Настройки на курса Създай нов предизвикателство Отговори Отговори на курса Пространство за "малката атака"

Предизвикателства

1) Движение

Описание на предизвикателството: Използвайте нов механизъм "Движение на спрайт" и го изтрийте.

Иван "Томас"

↓

2) Сензори за цвят

Описание на предизвикателството: Използвайте нов механизъм "Сензор за цвят" и го изтрийте.