CODING FOR INCLUSION

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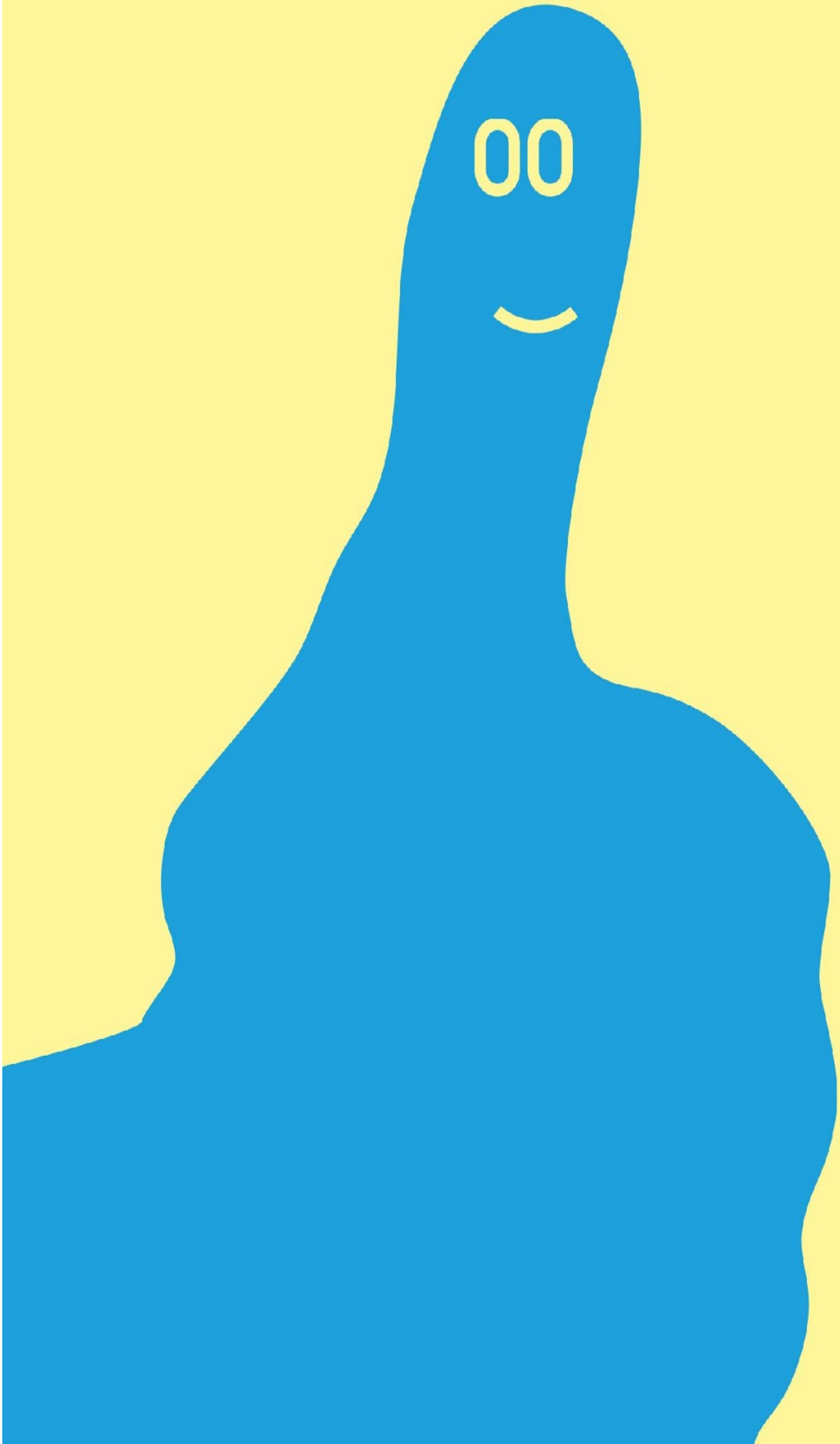

BELGIUM - Codinc report

Coding for Inclusion – CODINC

WP4- Experimentation Report

2019

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Erasmus + KA3 Support for Policy Reform

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Partners:

ALL DIGITAL aisbl (Belgium), MAKS vzw (Belgium), COLECTIC coop (Spain), 21st Century Competency Centre (Germany), University of Naples Federico II (Italy), Educentrum vzw (Belgium), Cyprus Computer Society (Cyprus)

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Executive summary

CODINC - Coding for inclusion is a project that contributes to digital inclusion and equal educational opportunities for all through peer-to-peer learning workshops. It was well received by the 69 primary and 23 secondary school students from disadvantaged backgrounds that were involved, as well as their teachers. It promoted self-confidence and initiative in the secondary school students, who got the opportunity to discover new talents and interests related to teaching and training, as well as confidence in their own knowledge and abilities. By allowing them to take responsibility, both for themselves and the primary school children in their care, they developed new and strengthened existing skills.
The primary school children got the opportunity to explore coding and coding tools that they might otherwise not get into contact with. Moreover, being trained by fellow students provided them with role models closer to their own age than their regular teachers.

The biggest challenge of the project was engaging the teachers, in particular those of the primary school. However, the teachers that were engaged, were very enthusiastic and are already looking for ways to continue the project next year.

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Introduction

The project

Since its inception, eduCentrum vzw has been passionate about bringing STEAM[1] and maker education to all children, with a special focus on those kids that, for a variety of reasons, tend to miss the boat on all things digital. This tradition is continued in the CODINC project, itself an adaptation and scale up of a specific inclusive learning good practice: Capital Digital.

The CODINC project kicked off in February 2018 as a collaboration between seven partners from five countries. It aims to foster the STEM[2] education of disadvantaged youth through an inclusive, peer-learning pedagogical method: 16-18 year old youngsters from disadvantaged backgrounds are trained on how to teach coding and programming to their younger 10-12 year old peers. This report gives an overview of the activities that eduCentrum vzw has undertaken so far in order to achieve the project's goals and ambitions.

Activities

From the start of the project, eduCentrum vzw has partnered with digitaal.talent@Gent and Onderwijscentrum Gent, two local organizations that improve digital inclusion and stimulate equal educational opportunities for all. They form the link between eduCentrum vzw and the city of Ghent and ensure the project will have maximal impact. They have been involved throughout the project's lifetime.

CODINC activities can be categorized in several phases, for each of which specific goals were set forward:

- Preparation
    - Train-the-trainer workshop
      On July 4th and 5th, a 2-day internal training session took place in Barcelona. eduCentrum mentors were trained in the CODINC training methodology, the use of the CODING Portal, and the building of a learning community.
    - Selection of participants
      We selected three primary school classes of 23 students each, as well as one secondary school class of 23 students, to participate in the activities. An additional primary and secondary school class was selected to serve as a control group.
- Experimentation
    - Phase 1: Piloting in secondary schools
      In preparation of the coding week, the selected secondary school students received ten hours of training, using the toolkit provided.
    - Phase 2: Peer-to-peer-learning coding weeks
      Over the course of five sessions of two hours each, the secondary school students provided ten hours of training to their primary school peers.
    - Phase 3: Training school teachers
      Teachers from both participating schools were offered a free three hour

[1] Science – Technology – Engineering – Arts – Mathematics
[2] Science – Technology – Engineering – Mathematics

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training session on digital tools they can use in their classes. Ten enthusiastic teachers participated.

- Assessment and evaluation
  Four distinct evaluations (Moreno Sociometric, Self-Efficacy, Teachers attitude, and Relations between students and teachers) both before and after the experimentation activities, were intended to provide insight in the effects of the activities in terms of their perception about their capabilities, their efficacy while working in groups, …
- Conclusions and policy recommendations
  The results from the assessments and evaluations will be translated into concrete policy recommendations.

Regional context

Belgium is a small, but complicated country. It is subdivided not only in three language-based communities (French, Flemish, and German-speaking), but also in three economy-based regions (Walloon, Flanders, and Brussels-capital). The regions and communities overlap largely, but not completely, which results in distinct cultural, social, and economic differences. For example, where the average yearly income in Belgium is €17 824 euro, this is higher in Flanders (€19 102), but lower in Wallonia (€16 787) and Brussels-Capital (€13 980)[3]. Since the city of Ghent is located in Flanders, we will compare any statistics with Flemish, rather than with national data, since this would result in a skewed perspective.

Demographic situation

With over 260 000 inhabitants, Ghent is the second largest city in Flanders, after Antwerp. The average netto yearly income amounts to €18 235 - above the national average, but below the regional average. However, there is a large gap between the least and most affluent families: while in Flanders one in ten children is born to a disadvantaged family, for Ghent this number reaches one in five[4]. A similar picture arises when comparing unemployment rates: in Flanders, there is a 11.7% youth unemployment rate (5.88% overall); meanwhile in Ghent, 17.52% of youngsters below 25 are unemployed (9.71% overall)[5]. It is no coincidence that school dropout rates follow the same trend as well: 11% in Flanders versus 15.6%, or one in seven, in Ghent[6].

33% of Ghentians have a foreign background. Around one third has Turkish of Maghrebian roots, another third has a European background, and the remaining third originates from outside Europe, Turkey, and Maghreb. Again, there are large differences within the city, with some more central neighborhoods having a migrant population of over 50%, while those at the edge of the city often don't even reach 15%[7].

3 https://statbel.fgov.be/sites/default/files/files/documents/Huishoudens/10.9%20Fiscale%20inkomens/fisc2016_C_NL.xls
4 https://www.ocmwgent.be/Kinderarmoede.html
5 https://arvastat.vdab.be/arvastat_detailtabellen_werkloosheid.html
6 https://onderwijs.vlaanderen.be/nl/nl/onderwijsstatistieken/gemeenterapporten/gemeenterapporten-vroegtijdig-schoolverlaten-voor-het-secundair-onderwijs
7 https://gent.buurtmonitor.be/

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Educational context

In Flanders, nearly all schools are public. An average class consists of 20-25 pupils and one teacher. Depending on the number of students and the choices made by the school, there may be additional teacher(s) which do not teach a specific class, but instead give extra support or challenges to students who need these. For example, "care coordinators" support children who experience challenges with learning as well as their parents, "ICT coordinators" who coach and stimulate teachers to use ICT in their classrooms, …

The average Flemish school is reasonably well-equipped in terms of ICT-materials. According to the most recent ICT-monitor, a five-yearly poll conducted jointly by the universities of Ghent and Leuven, nearly all schools have wireless internet, nine out of ten have interactive whiteboards in each classroom, and the average ratio of computers to students is one in four[8].

Unfortunately, these numbers may paint too rosy a picture. Internet connections specifically, while usually present, are not necessarily reliable. Moreover, much of the hardware is outdated, and just because the materials are present, doesn't mean they're actually being used. Neither computational thinking nor programming are compulsory subjects in primary schools, and while some teachers do appreciate the added value of these topics and make an effort to introduce them to their students, this is not standard practice and therefore highly dependent on the motivation of both the teacher, their colleagues, and the school board.

The ICT-monitor also shows that while teachers consider both their own and their students' computer skills to be adequate, students themselves are less confident in their skills compared to five years ago. Notably, this seems to be more related to an increase in the students' expectations rather than an actual decrease in skills. A project such as CODINC, which focuses strongly on the social and personal aspects peer-to-peer learning rather than simple knowledge transfer, holds a lot of potential to give these students a much-needed boost of confidence.

Experimentation

Timeline

October 8	Multiplier event
February 28	Pre-evaluation control group secondary education
April 4 – 5	Piloting secondary school
April 29 – 30	Piloting primary school
May 22	Primary school teacher training
June 4	Post-evaluation control & activities group secondary education
June 21	Evaluation control group primary education

[8] https://onderwijs.vlaanderen.be/nl/ons-klaslokaal-is-digitaal-vlaamse-scholen-tellen-meer-laptops-tablets-en-digiborden

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Selection of Participants

One important criterium used while selecting the school partners, was the number of GOK students. "GOK" stands for "Gelijke OnderwijsKansen" or "Equal Educational Opportunities" and consists of four criteria. They are:

1. the student's mother did not finish secondary education;
2. the student received a scholarship the year prior;
3. the student does not speak Flemish at home;
4. the student lives in a disadvantaged neighborhood[9].

Studies have shown that students who tick off one or more of these criteria, are more at risk to fall behind, drop out without qualifications, and/or fail to find a job.

Other criteria used when selecting the school partners were:

- location in disadvantaged neighborhood
- relative number of migrant populations in the neighborhood
- proximity of the selected secondary and primary schools
- motivation of the school and the teachers involved

We partnered with **Sint-Lievenscollege**, a secondary school which has high percentages of GOK students and is located in a neighborhood with a 32.3% percent migrant population. It offers, among others, an IT field of study, meaning we could engage students who already had pre-existing interest and knowledge in ICT and technology. Moreover, there is a primary school connected to the secondary school, which would reduce communication and planning issues.

Unfortunately, however, the primary school had no interest in participating in the project, and we set out to look for a new primary school partner. To avoid mobility issues for the secondary school students, we focused on primary schools within walking distance (1km) of the secondary school. We finally settled on **Vrije Basisschool Sint-Bavo**. Two 5th grade classes and one 6th grade class (10-12-year-olds, around 23 students per class) were selected to participate in the project. At Sint-Lievenscollege, a class of 5th year IT students (17-year-olds, 23 students) was selected.

All students involved had some pre-existing programming knowledge. The secondary school students, of course, study IT. The primary school children for their part had already completed Hour of Code last year thanks to CodeCity. This project, which offers free one-hour coding workshops to every school in Ghent, is courtesy of the city of Ghent, and is led by eduCentrum.

Initially, it was envisioned that the CODINC activities would be taking place after school or during lunch break. However, after discussion with the partner schools it was decided to plan all activities during school hours for ease of organization and planning.

Phase 1: Piloting in secondary schools

On April 4th and 5th from 9h00 to 17h00, the 23 secondary school students of Sint-Lievenscollege came to Fyxxi for their two-day training of the CODINC project. The program was set out as follows:

- Day 1
    - Intro Pre-evaluation

[9] Disadvantaged neighborhoods are identified by determining the percentage of 15-year-olds who are two or more years behind in school.

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- Session 1 Offline programming
    - Session 2 Run Marco, Light Bot, Hour of Code, Drawing Pixels
    - Session 3 Introduction to Scratch
    - Session 4 A first project in Scratch
- Day 2
    - Session 1 Pedagogical skills
    - Session 2 - 3 micro:bit
    - Session 4 Code Etiquette
    - Outro Post-evaluation

Since the students were studying IT and therefore already had a solid grasp of programming concepts, for the introductory activity we deviated from the options provided by the toolkit. Instead, we gathered the students in the park and divided them into groups of 3.

- The first student saw the playing field but was not allowed to talk and could only give instructions through gestures.
- The second student was allowed to talk but sat with his back to the playing field.
- The third student stood in the playing field but was blindfolded.

The goal of the activity was for the blindfolded student to find a package within the playing field by following the instructions of the second student. It proved a hearty challenge, and the students discovered that communication and a solid solution strategy were very important to eventually get the package.

Back at the lab the students were introduced to "Run Marco", "Light Bot", "Hour of Code", and "Pixel drawings". These 4 tools were first reviewed and tried out in small groups, after which each group came to the front and explained "their" tool to their classmates. Thus, they already got their first taste on how to best explain these concepts to others.

The remainder of the day was spent on Scratch: getting to know the language, making their first game, and of course linking the games to the Makeymakey.

Because the students already had a programming background, we decided to also introduce the micro:bit. None of the students had worked with this tool previously, but immediately and excitedly dove in. Lovemeters, bingo games, and rock-paper-scissor games soon rolled over the respective micro:bit screens. In the afternoon they even went a step further and connected buzzers and LED lamps to the micro:bit. A doorbell -with the use of 2 micro:bits- was also developed.

Overall, the students were very excited, as evidenced by the fact that one of them even brought his own keyboard to the second day of training. Developing the Scratch game - which brought back memories for a few of them- and the micro:bit in particular, were a big hit.

Five teachers accompanied the students during various times of the training. They taught religion, history, biology, ICT, and English, respectively. Unfortunately, they were mostly there to supervise the students, and did not participate much in the actual training.

Phase 2: Peer-to-peer-learning coding weeks

On April 29th and 30th, the peer-to-peer workshops took place. The 23 secondary school students were divided evenly over the three primary school classes, such that each student had a small group of three to four kids in their care. The program was set out as follows:

- Day 1

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    - 08h25 – 09h00 Pre-evaluation
    - 09h00 – 10h10 Introduction, Run Marco, Light Bot
    - 10h30 – 12h00 Drawing Pixels, Introduction to Scratch
    - 13h20 – 14h30 Make a Scratch game (brainstorming, concept decisions)
    - 14h50 – 15h40 Make a Scratch game (writing, testing)
- Day 2
    - 08h25 – 10h10 Finish Scratch game, presentation, MakeyMakey
    - 10h30 – 12h00 Introduction to micro:bit
    - 13h20 – 14h30 micro:bit projects
    - 14h50 – 15h40 Post-evaluation

The primary school children were very excited to start the project, as evidenced by the fact that one boy, who'd been ill the day before, insisted on coming to school even though his mother wanted to keep him home to get well a little longer.

The secondary school students for their part were a little ill at ease at the start of the first day, unsure of what to do with the responsibility they'd been given. More often than not, there was a literal distance between them and the children, and many even forgot to introduce themselves to their kids. Meanwhile the children themselves very easily adopted the students as authority figures, asking them questions and looking to them for advice. As a result, slowly but surely, the students started to get a little more comfortable in their role. By lunch time, names had been exchanged, and students were walking around the tables, crouching next to the children as they explained how to tackle a certain issue. The smaller age difference, combined with the fact that some of the older and younger students already knew each other, made for a relaxed atmosphere that encouraged everyone to have fun.

Since this was a compulsory activity, it was expected that not all students would be equally excited. This was particularly true for the secondary school students, since they were responsible for training and encouraging the children in their care. Moreover, they were all boys, usually limited experience in dealing with primary school children. However, the large majority of students did very well, and while a few students were less involved in teaching "their" children and mostly let them do their thing, another few went above and beyond to help their children and make their code work.

Unfortunately, as with the secondary school teachers, the primary school teachers were not very involved in the workshop, preferring to sit in the back of the class and correct assignments, or even leaving the classroom altogether.

An informal evaluation at the end of the second day showed that students and children alike were very excited about the project and had enjoyed both days of coding and coaching.

Phase 3: Training school teachers

Teachers from both the primary and secondary school partner were invited to participate in the teacher training taking place on May 22nd from 13h00 to 16h00. Unfortunately, and despite multiple reminders, none of the primary school teachers chose to partake. The secondary school teachers, however, were incredibly motivated and enthusiastic, and even ended up inviting a colleague from a third school to tag along. In total, 10 teachers participated in the training. Notably, they were not all STEM-teachers: the history and the French teacher were also present, and even the school principal took part.

A range of tools were introduced to the teachers, starting of course with those tools their students had also worked on: Scratch and micro:Bit. They then continued with Lego Mindstorms, mbot, InoBot, Hour of Code, and a number of educational apps. The teachers appreciated being able to try out several different things, as workshops usually focus on just

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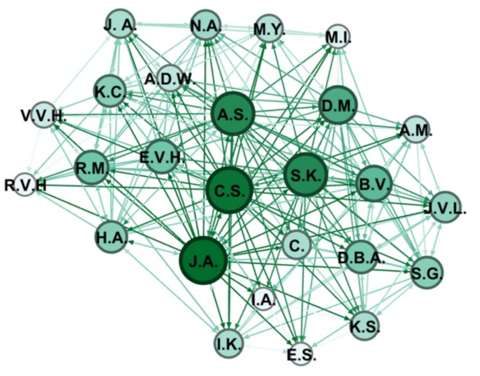
one tool. All tools were very well received, although the micro:Bit in particular got a very enthusiastic reception.

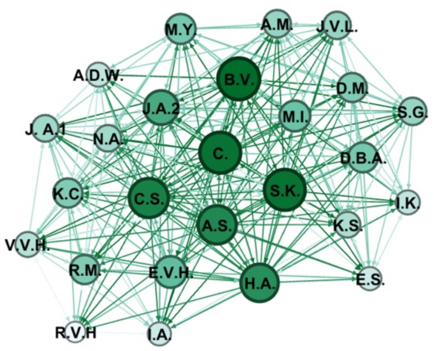
Infographics

Result Sociometric Test Pre and Post

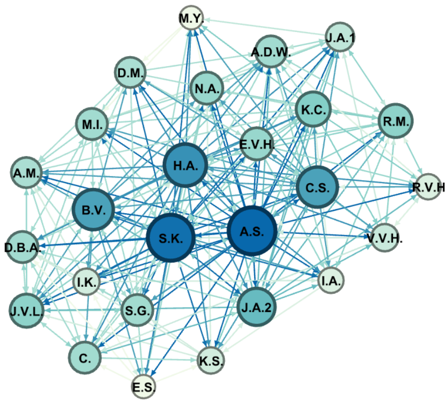
Ghent BaO 5a



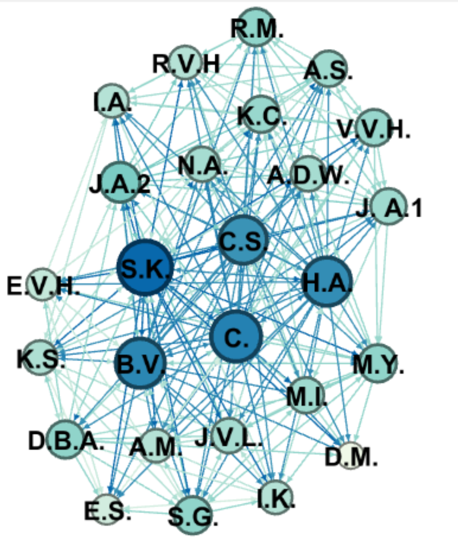
Ghent BaO 5a: Affective Total Pre-Test
Nodes: 26 - Edges 245 - Average: 9,42 - Density: 0,38 - Coherence: 0,45



Ghent BaO 5a: Affective Total Post-Test
Nodes: 26 - Edges 315 - Average: 12,11 - Density: 0,49 - Coherence: 0,52



Ghent BaO 5a: Group Total Pre-Test
Nodes: 26 - Edges 261 - Average: 10,03 - Density: 0,4 - Coherence: 0,48



Ghent BaO 5a: Group Total Post-Test
Nodes 26 – Edges 276 – Average 10,62 – Density 0,42 – Coherence 0,51

Test	Nodes	Edges	Average	Density	Coherence

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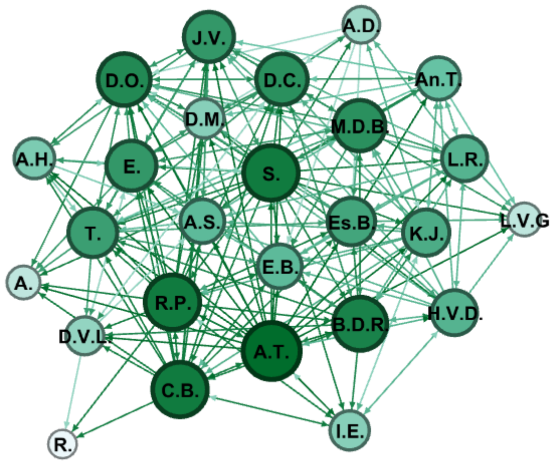
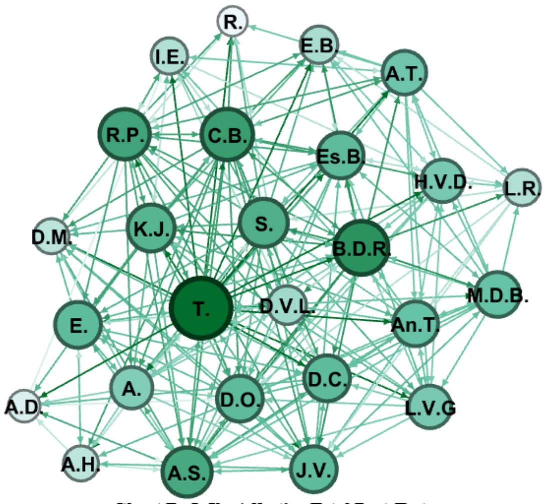
Affective Total Pre	26	245	9,42	0,36	0,45
Affective Selection Pre	26	131	5	0,2	0,5
Affective Total Post	26	315	12,11	0,49	0,52
Affective Selection Post	26	173	6,7	0,26	0,55
Group Total Pre	26	261	10.03	0,4	0,48
Group Selection Pre	26	130	5	0,2	0,58
Group Total Post	26	276	10,62	0,42	0,51
Group Selection Post	26	150	5,77	0,22	0,52

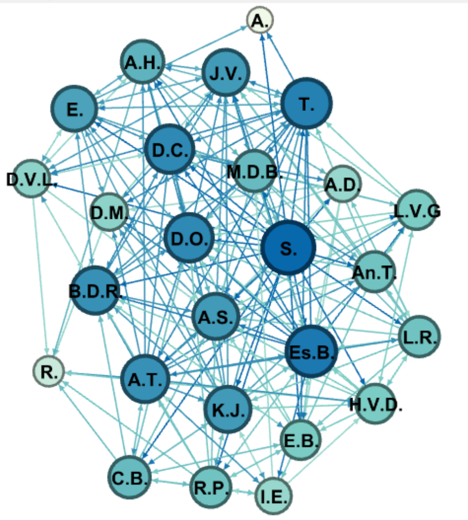
Ghent BaO 5b



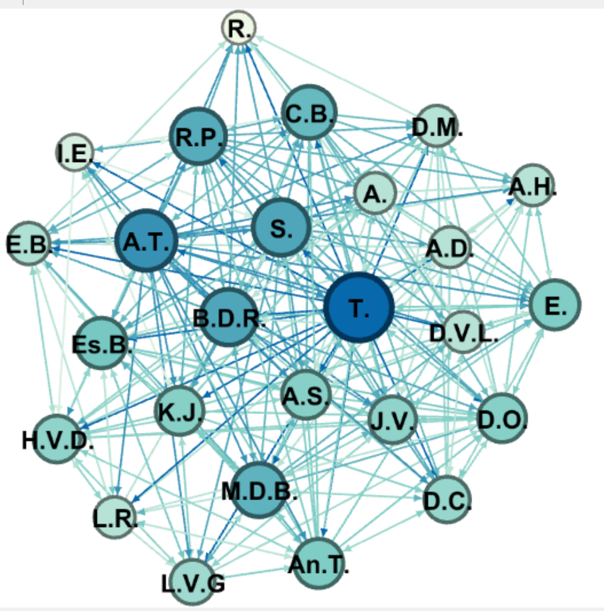
Ghent BaO 5b: Affective Total Pre-Test
Nodes 26 – Edges 224 – Average 8,62 – Density 0,34 – Coherence 0,44



Ghent BaO 5b: Affective Total Post-Test
Nodes 26 – Edges 256 – Average 9,84 – Density 0,38 – Coherence 0,48



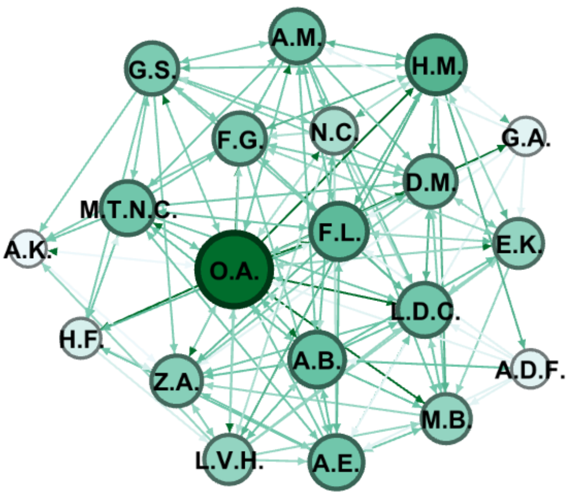
Ghent BaO 5b: Group Total Pre-Test
Nodes 26 – Edges 227 – Average 8,73 – Density 0,36 – Coherence 0,48



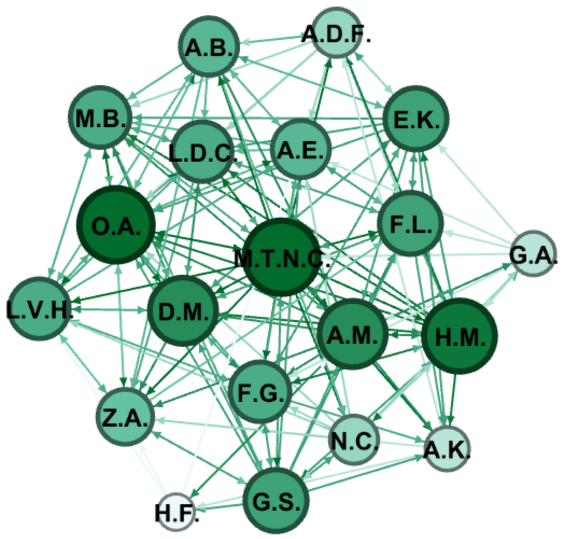
Ghent BaO 5b: Group Total Post-Test
Nodes 26 – Edges 280 – Average 10,77 – Density 0,41 – Coherence 0,58

Test	Nodes	Edges	Average	Density	Coherence
Affective Total Pre	26	224	8,62	0,34	0,44
Affective Selection Pre	26	102	3,92	0,15	0,61
Affective Total Post	26	256	9,84	0,38	0,48
Affective Selection Post	26	110	4,23	0,16	0,58
Group Total Pre	26	227	8,73	0,36	0,48
Group Selection Pre	26	108	4,15	0,16	0,72
Group Total Post	26	280	10,77	0,41	0,58
Group Selection Post	26	124	4,77	0,18	0,63

Ghent BaO 6



Ghent BaO 6: Affective Total Pre-Test
Nodes 20 – Edges 160 – Average 8 – Density 0,4 – Coherence 0,6



Ghent BaO 6: Affective Total Post-Test
Nodes 20 – Edges 164 – Average 8,2 – Density 0,41 – Coherence 0,56

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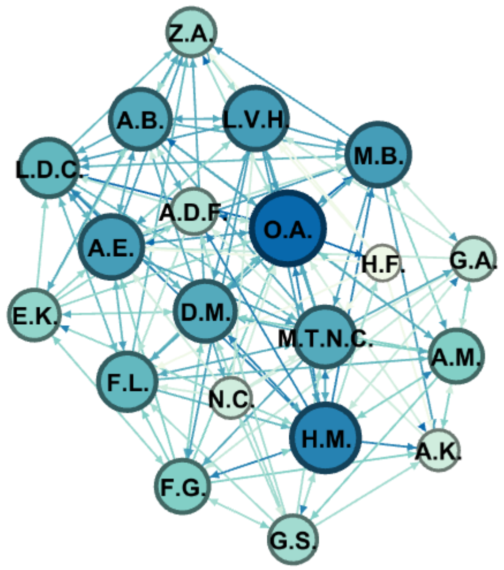
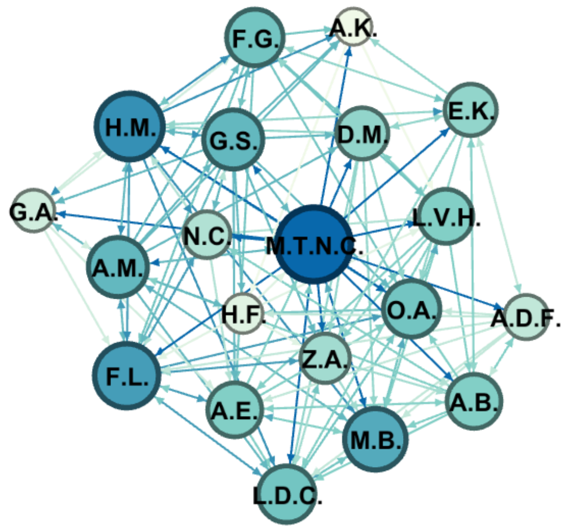


Ghent BaO 6: Group Total Pre-Test
Nodes 20 – Edges 155 – Average 7,75 – Density 0,39 – Coherence 0,51



Ghent BaO 6: Group Total Post-Test
Nodes 20 – Edges 149 – Average 7,45 – Density 0,37 – Coherence 0,56

Test	Nodes	Edges	Average	Density	Coherence
Affective Total Pre	20	160	8	0,4	0,6
Affective Selection Pre	20	81	4,05	0,2	0,67
Affective Total Post	20	164	8,2	0,41	0,56
Affective Selection Post	20	92	4,6	0,23	0,59
Group Total Pre	20	155	7,75	0,39	0,51
Group Selection Pre	20	86	4,3	0,22	0,58
Group Total Post	20	149	7,45	0,37	0,48
Group Selection Post	20	90	4,5	0,23	0,56

Ghent SEC

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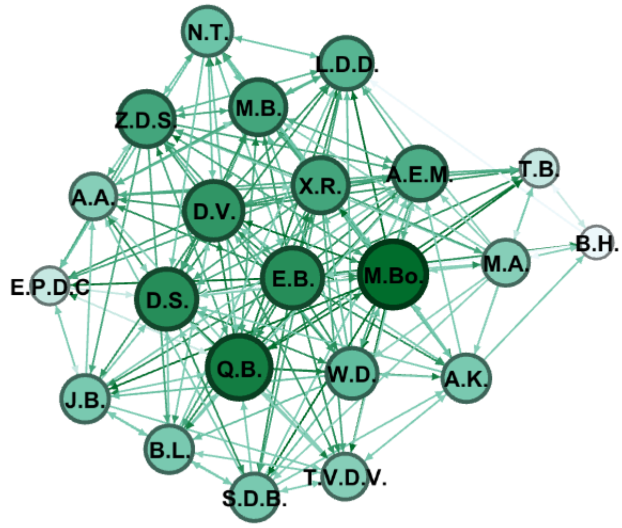
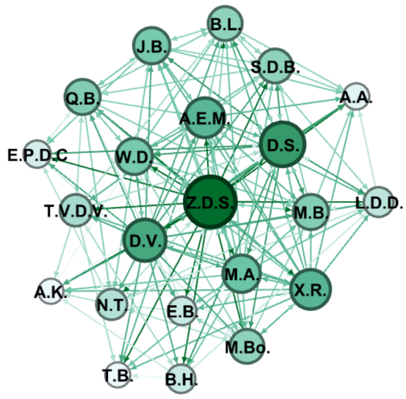
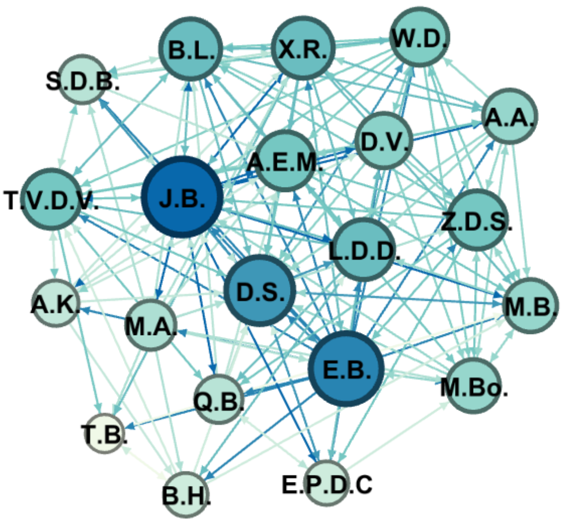


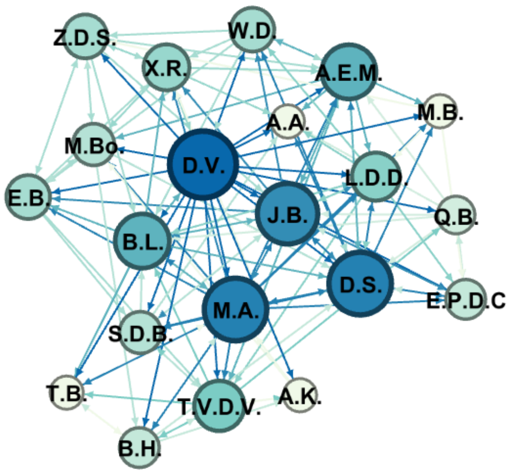
Ghent SEC: Affective Total Pre-Test
Nodes 22 – Edges 210 – Average 9,6 – Density 0,43 – Coherence 0,51



Ghent SEC: Affective Total Post-Test
Nodes 22 – Edges 188 – Average 8,5 – Density 0,39 – Coherence 0,52



Ghent SEC: Group Total Pre-Test
Nodes 21 – Edges 170 – Average 8,1 – Density 0,39 – Coherence 0,47



Ghent SEC: Group Total Post-Test
Nodes 21 – Edges 138 – Average 6,6 – Density 0,31 – Coherence 0,45

Test	Nodes	Edges	Average	Density	Coherence
Affective Total Pre	22	210	9,6	0,43	0,51
Affective Selection Pre	22	165	7,5	0,34	0,57
Affective Total Post	22	188	8,5	0,39	0,52
Affective Selection Post	22	145	6,6	0,3	0,5
Group Total Pre	21	170	8,1	0,39	0,47
Group Selection Pre	21	116	5,5	0,26	0,49
Group Total Post	21	138	6,6	0,31	0,45
Group Selection Post	21	97	4,6	0,22	0,45

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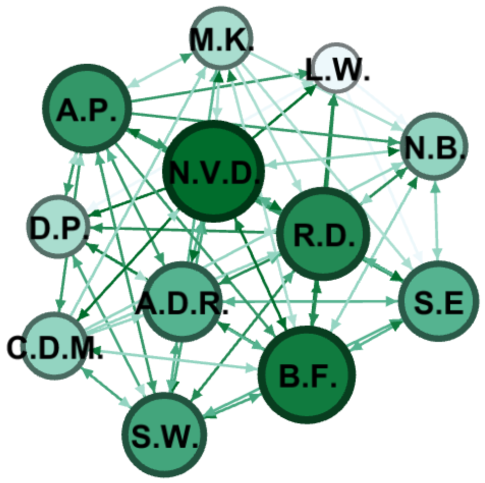
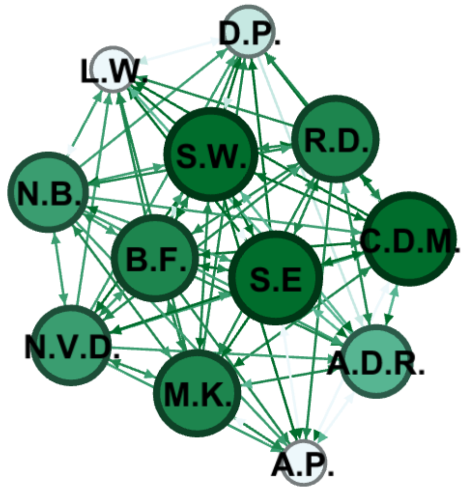
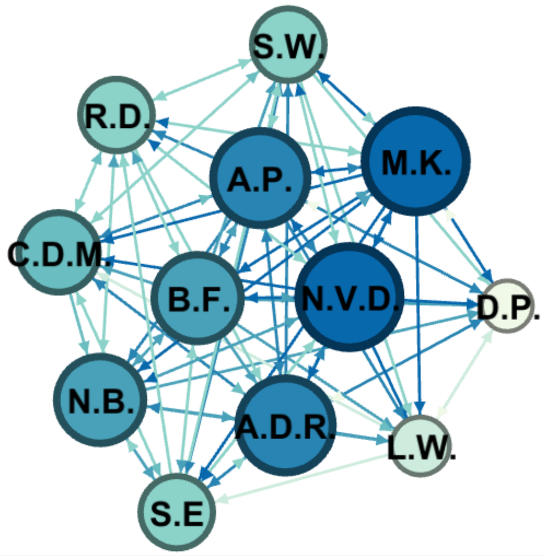
Ghent SEC- control



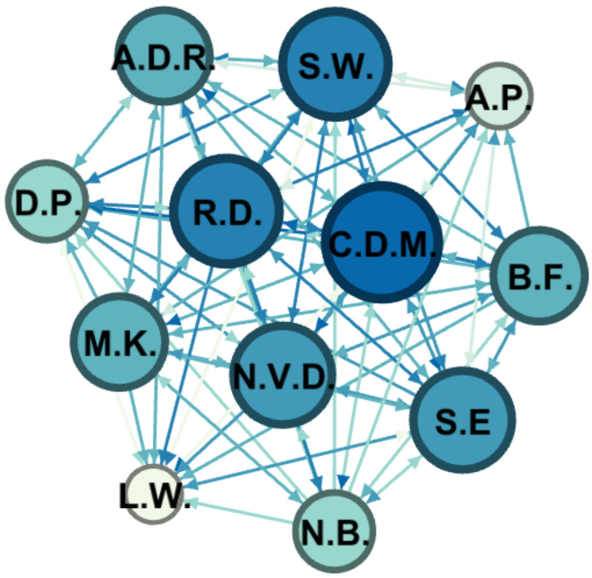
Ghent Sec Controle: Affective Total – Pre-test
Nodes 12 – Edges 87 – Average 7,25 – Density 0,60 – Coherence 0,68



Ghent Sec Controle: Affective Total – Post-test
Nodes 12 – Edges 105 – Average 8,75 – Density 0,73 – Coherence 0,78



Ghent Sec Controle: Group Total – Pre-test
Nodes 12 – Edges 97 – Average 8,1 – Density 0,67 – Coherence 0,74



Ghent Sec Controle: Group Total – Post-test
Nodes 12 – Edges 112 – Average 9,33 – Density 0,78 – Coherence 0,86

Test	Nodes	Edges	Average	Density	Coherence
Affective Total Pre	12	87	7,25	0,6	0,68
Affective Selection Pre	12	55	4,58	0,38	0,76
Affective Total Post	12	105	8,75	0,73	0,78
Affective Selection Post	12	63	5,25	0,44	0,79
Group Total Pre	12	97	8,08	0,67	0,74
Group Selection Pre	12	58	4,83	0,4	0,66
Group Total Post	12	112	9,33	0,78	0,86

Group Selection Post	12	78	6,5	0,54	0,74

Result Self Efficacy and TATS Scale - Pre and Post

Ghent BaO 5a

The SELF EFFICACY scale was administered before and after activities, to 26 students, 14 females and 12 males with an average age of 10.46 years of the BaO 5aclass. The data analysis shows that the average in the pre-test is 4.98, in the post-test it is 5.11; the standard deviation in the pre-test is 1.32, in the post-test it is 1.26.

To determine whether the difference between pre- and post-test averages was significant, we ran the Student t-test, the analysis showed that there is no statistically significant difference (p-value0.740211).

Ghent BaO 5b

The SELF EFFICACY scale was administered before and after activities to 24 students of the BaO 5bclass. The data analysis shows that the average in the pre-test is 4.92, in the post-test it is 4.96; the standard deviation in the pre-test is 1.39, in the post-test it is 1.46

To determine whether the difference between pre- and post-test averages was significant, we ran the Student t-test, the analysis showed that there is no statistically significant difference (p-value0.720051).

Ghent BaO 6

The SELF EFFICACY scale was administered, before and after activities, to 20 students, 17 females and 3 males with an average age of 11.5 years of the BaO 6class. The data analysis shows that the average in the pre-test is 4.95, in the post-test it is 5.13; the standard deviation in the pre-test is 1.18, in the post-test it is 1.37.

To determine whether the difference between pre- and post-test averages was significant, we ran the Student t-test, the analysis showed that there is no statistically significant difference (p-value0.19291).

Ghent SEC

The SELF EFFICACY scale was administered, before and after activities, to a class group of 22 male students with an average age of 16.72 years, SECclass. The data analysis shows that the average in the pre-test is 5.12, in the post-test it is 5.19; the standard deviation in the pre-test is 1.18, in the post-test it is 1.13.

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To determine whether the difference between pre- and post-test averages was significant, we ran the Student t-test, the analysis showed that there is no statistically significant difference (p-value0.87565).

The TATS scale was administered, before and after activities, to a class group of 21 male students with an average age of 16.57 years of an SEC class. The data analysis shows that the average in the pre-test is 3.31, in the post-test it is 3.43; the standard deviation in the pre-test is 1.09, in the post-test it is 1.08.

To determine whether the difference between pre- and post-test averages was significant, we ran the Student t-test, the analysis showed that there is no statistically significant difference (p-value0.530235)

SEC Control

The SELF EFFICACY scale was administered, before and after activities, to a control group of 12 students, 3 females and 9 males with an average age of 16.58 years of an SEC class. The data analysis shows that the average in the pre-test is 5.05, in the post-test it is 5.07; the standard deviation in the pre-test is 1.10, in the post-test it is 1.87.

To determine whether the difference between pre- and post-test averages was significant, we ran the Student t-test, the analysis showed that there is no statistically significant difference

(p-value 0,983654).

The TATS scale was administered, before and after activities, to a control group of 12 students, 3 females and 9 males with an average age of 16.66 years of a CONTROL SEC class. The data analysis shows that high school the average in the pre-test is 3.20, in the post-test it is 3.19; the standard deviation in the pre-test is 1.18, in the post-test it is 1.02.

To determine whether the difference between pre- and post-test averages was significant, we ran the Student t-test, the analysis showed that there is no statistically significant difference

(p-value 0,808781).

Conclusions

CODINC is a unique and engaging project for teachers, but in particular for students. Primary school children got the opportunity to work with tools and programs that were new and exciting to them, and that they would not usually get to work with. Thus, they got to explore a possible new interest in and talent for coding. The secondary school students on the other hand, were already studying IT, and got to experience how it feels to pass on their knowledge, rather than just expand it.

While both primary and secondary school children were actively engaged in the workshops, it was particularly noteworthy how the "trainers" started to care for "their" kids, helping them in making the game they had in mind and being visibly proud when the games were presented to the whole class. It wasn't until the end of the training, however, that the secondary school students realized this had been their first official working experience, and something they could put on their CVs. It was a sort of triumphant moment that turned the training into just another thing they had to do for school, to something they could benefit from, and illustrated nicely exactly what impact this kind of project can have on young people.

Challenges & obstacles

- Unfortunately, the teachers of the primary school in particular were not very involved with the project, choosing to observe from a distance or even to disappear from the classroom altogether. Even the free training session did not draw any enthusiasm. Maybe organizing the training session before the start of the coding week could increase participation during the workshop.
- The secondary school class that was selected was a boys-only class. While this did not cause any issues in itself, a more diverse team of trainers would be beneficial to both boys and girls.
- Clear rules of conduct for everyone involved would be advantageous. While the secondary school students were supposed to be in a position of responsibility, they were often treated as primary school children by the primary school teachers. This led to a number of awkward moments and visible loss of confidence.
- The questions of the evaluations were difficult for primary and secondary school students alike. A different evaluation for both target groups, focusing on the different goals that are set for each group, would allow a broader and clearer evaluation.
- It was decided by both partner schools to do the peer-to-peer training on two full, consecutive days. This allowed for a fun atmosphere in which everyone learned very much, very fast, but by the end of the second day it became clear that some students had had enough. Spreading the workshops, a little more, or breaking up the activities with short energizers, would give the participants a more time and space to process the activities.
- Tablets would be more convenient to use than laptops, and make for easier transportation.
- The secondary school students needed more support on peer-to-peer learning. The toolkit could include activities to let them think about who will do the introduction, welcome the students to class, keep an eye on the timing, …

Future

We are currently looking to continue the project, possibly with local funding. To simplify planning and organization, we would opt to have 6th graders (17-18-year-olds) teach 1st graders (12-13-year-olds).

Policy recommendations on a national level

Training students to pass on their knowledge to their peers can boost their confidence, help them discover new talents, and avoid drop-outs in school. Secondary school students from every area should have the opportunity to become involved in "training to be trainers" activities, either within their own school, at another school, or even at afterschool activities. Conversely, primary school children from underprivileged areas will benefit not only from being introduced to coding and programming, but also from interacting with their peers, who act as role models.

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