Motivations

- Computational thinking (CT) or computer science (CS) curricula are introduced in schools
- "coding" is used in schools, especially referring to introductory programming activities
- "computational thinking" sounds abstract and intimidating
- "programming" seems to recall the "boring and nerdy" professional activity
- "coding" can capture the interest of students, and "also provides an element of mystery (there are hints of a secret code), and achievement (cracking the code)" [1]
- the confusion induced by "coding mania" in the media can be very harmful

Research question

Which relation Italian primary school teachers see between coding and programming?

Q1 In my view coding is...
Q2 In your view is there any difference between coding and writing programs?
Q3 If you wish, explain why...

Sample description

N=972. Investigation done in the context of Programma il Futuro project (see poster beside).

Viewpoints

There is no agreement in the CSEd community about the relationship between coding and programming. Some authors use the two terms interchangeably as synonyms while others state both (e.g., write "programming/coding"). A few authors do not consider them as equivalent and analyzed their difference [1, 2, 3]. To Computer Scientists it is clear that "coding" and "programming" have a strict relation: they are tools to teach what matters (CS core principles). Giving excessive importance to "coding" may lead to the wrong idea that its value is greater than the CS scientific concepts themselves [2].

Qualit. analysis: methodology

- filter irrelevant answers (N → 798)
- first (independent) proposal of categories, grounded on definitions and on literature
- joint discussion and agreement on the proposed set of categories (labels)
- independent labeling of answers (and proposal for category modifications)
- joint discussion and final agreement and labeling (one or more labels per answer)

Q1 preliminary results

59% of answers had AT LEAST ONE label of the Related categories
41% of answers had NO label of the Related categories

Q2 preliminary results

(N → 758)
60% answered there is difference
40% answered there is NO difference
NB: Teachers who answered "NO difference" to Q2 answered to Q1 like the entire sample.

Q1 analysis: categories

Related (each category somehow "speaks" about writing programs)

PROC Specifying processes: devising an algorithm to solve a problem; providing a list of instructions to solve a problem; making an information processing agent execute a sequence of elementary steps
PROG Writing programs: using programming languages
SIMP Simplified programming: programming with simplified environments/ languages (e.g.: visually, blockily); learning the basics of programming

Unrelated

ACTI Being active towards information technology: creating computational artifacts instead of simply using them; being able to find creative or original solutions to problems
COLE Cognition and learning: reflecting about thinking or learning; program to learn; learning to learn; develop/ improve cognitive abilities; a method/ approach to teaching/learning
DECT Developing computational thinking: a way to teach/ develop/ apply CT
ENGA Engagement: doing playful/ funny/ attractive/ interesting/ inspiring activities
LOCR Logical/critical thinking: logical or reasoning or analytical skills; applying/developing critical thinking
PROB Solving problems: plan(s), design(s), action(s) or process(es) leading to solve a problem, to reach a goal, to face a complex situation (including splitting a complex problem in simpler subproblems to solve it more easily)
TRAN Transversal competence: e.g. fourth skill, transversal skill, life skill, useful in other fields, of general use

References

Goal
• Spread awareness of informatics as a science
• Computational thinking (CT) as a key competence for modern education (parallel with physics, biology, chemistry, …)
• CT as the "scientific core" of digital competencies

Organization
• Endorsed by the Ministry of Education, implemented by CINI.
• Financially supported by companies
• Started in school-year 2014-15
• Optional teachers’ participation

Teaching material
• Based on Code.org teaching material
• Accessible via web (hence scalable and flexible)
• Interactive (but also unplugged) and attractive
• Visual programming and self correcting exercises
• Slowly increasing difficulty and complexity
• Lesson plans and teacher dashboard

Actions
• Translation and adaptation (text and video)
• Support site (http://programmamilfuturo.it) to enable growing an Italian community of users
• Detailed description for each course and lesson
• Videos with a step-by-step guidance to each lesson
• Users forums
• Social channels (YouTube, Facebook, Twitter)

Support
Marco Belinelli, NBA championship winner
Italian Members of Parliament from the bipartisan group "Intergruppo Innovazione"

Research
Project results are described in more detail in the following research papers:
[1] Isabella Corradini, Michael Lodi, and Enrico Nardelli. Computational Thinking in Italian Schools: Quantitative Data and Teachers’ Sentiment Analysis after Two Years of “Programma il Futuro” Project. In 22nd ACM Annual Conference on Innovation and Technology in Computer Science Education (ITiCSE-2017), Bologna, Italia.

Schools Target
At the end of the school-year 2016-17
TARGET 1: Involve at least 40% of 8,281 schools
RESULT 1: Presence in 5,856 schools (71%)

Classes Target
At the end of the school-year 2016-17
TARGET 2: Carry out 10 hours in at least 9% of 370,597 classes
RESULT 2: 13.56 hours on average in 83,101 classes (22%)

Schools
Teachers

Classes
Students

Partners (school-yr 2017-18)
Benefactors
Donors
Media partner