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# T4T: A Peer Training Model for In-service Teachers

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## ABSTRACT

While working for a new presence of Informatics in schools we face the compelling problem of in-service teachers training. Related solutions must consider different needs of different teachers. Besides, the serious lack of skilled teachers forces to offer activities through which teachers can shortly be operative and experiment their new competencies in schools. The project Teachers for Teachers (T4T) originates from these needs and offers hands on activities, called units, where trainees work on several different types of contents, adapt and/or extend them and then can directly propose their results in schools. These contents come from the cooperation between a group of university researchers and a group of in-service teachers who together design educational activities, then experience them in schools during one or more school years and finally share them with their colleagues during T4T meetings. The project name recalls that its activities are conceived by teachers and researchers and shared with other teachers, thus implementing a peer training model.

## Categories and Subject Descriptors

K.3.2 [Computer and Information Science Education]: computer science education

## General Terms

Experimentation, Human Factors, Open data..

## Keywords

introduction to Informatics, digital literacy, programming, computing science, teachers' training methods.

## 1. INTRODUCTION

In several countries, activities are growing toward defining a new presence of informatics in schools as proposed in [1]. The compelling problem to face is in-service teachers training. Many teachers have little computing competencies if any, others practice teaching of how to use Office suites or some other educational digital tools, others have been teaching for many years but, often involved in clerical services, had short time for updating their competencies and educational methodologies. Thus training must be different for different teachers and in most cases the serious shortage of competent teachers forces to find activities through which trainees can shortly be operative in applying in school their newly acquired competencies.

The Informatics department of the University of Torino partly supports the project T4T with its free hands-on activities in the department laboratories to introduce computational thinking in k-12 education. Intended audience are teachers, from any level and sort of schools. The T4T general framework consists of an annual workshop offering several half day hands on activities usually carried out in autumn. Each attendee assembles the program most suitable to her/him choosing among these units. Also, a number

of follow up events, approximately one per month are organized during the school year. All these in person meetings are supported by the T4T on line community. Google CS4HS has been the main contributor of the project in 2012 and 2013.

The peculiar principle of the activities is to focus on contents that can be immediately proposed by attending teachers to their own students. Because of the very short time that in-service teachers usually have, activities are proposed with a look-see-Inside-modify-share methodology. Attending a unit the trainees look at the activities and use them, then they are engaged in several ways, in particular by the reference-teachers, to modify what is offered and to develop their own version. After each T4T unit most trainees are up to involve their students in the versions of one or more activities they have modified and feel comfortable with though perhaps barely different from the original ones. Thus the project complies with the well known motto "teach teachers as you want they teach". T4T is organized by a working group whose members are university researchers and in-service teachers (called reference-teachers) who design several activities developed in different pedagogical ways. Here we sketch two workshop units most representative of the different types of trainings. One concerns introducing programming and computing and is centered on the development of the project Literacy from Scratch first designed in UK to engage teachers and pupils in valid computer programming work at an elementary stage through creative story-telling. The second is the "Open access to open data" unit devised for teachers in beginning years of the secondary school where they are often requested to teach data management by teaching how to use some Office suite.

## 2. CREATIVITY AND PROGRAMMING

The units for introducing teachers to informatics aim at showing how programming can be a tool for expressing creativity. In previous years, the T4T introductory units concerned educational robotics using BeeBot and NXT, Logo and EasyLogo [Salanci]. Inspired by Lawrence Williams' and M. Cernochova's work at WCCE 2014, a story telling activity using Scratch was organized during the T4T-2013 annual workshop with a first unit of four hours and during three of the following monthly meetings for a total of around 12 hours in presence plus on line cooperation activities.

First, one hour talk given by Lawrence Williams was offered to all T4T participants as an experience useful to all teachers, also to teachers expert in informatics to contrast their routine activities for introducing to programming based on traditional algorithms developed in traditional ways, misunderstanding the spirit of Scratch. After the talk, twenty-two teachers attended the story-telling unit introducing to the use of Scratch and thus introducing to programming and more generally to computing. The unit lasted four hours of guided hands-on activities structured according to a

look-seeInside-modify-share methodology along the following steps:

- a. Two stories were shown both ideated and developed by English pupils at the end of their last primary school year [12]. In “Bacon and eggs” it’s breakfast time, an egg is going to be cooked and a pig declares himself a dog when the old lady says that some bacon would go well cooked with the egg.
- b. A short introduction of the Scratch environment followed showing how each actor (Sprite in Scratch) of the tale has its own sequence of commands describing its play script (this is the actual Scratch name) i.e. its behavior.
- c. Attendees were then organized in two-three persons groups whose first activity has been translating from English to Italian the sentences in the original story “Bacon and eggs”. Some attendees changed the sentences as they liked better, of course. This allowed the attendees-teachers to work toward producing something they could immediately feel as their own, they could show and work on with their pupils: this peculiarity was much appreciated by the participants.  
  
One of the teachers, back to her school, proposed this same activity to her students showing both stories. An enthusiastic pupil gave back a Nocturnal animals translation in Russian (immediately published on the school site).
- d. Each group was asked to produce a story of its own and, while going from one group to another, the conductors focused on Scratch components which participants could profit in the story they were working at. Few moments of working all together were also present. The groups were asked, if they wanted, to upload the stories they invented for a public discussion.
- e. Finally there was a common show and a public discussion of the uploaded stories with exchanges of programming novelties that one group found and used with the other attendees.

The stories uploaded during d and e steps are gathered in the T4T community environment: they are very short yet the September workshop gave to participants ideas for different activities, for where one can find projects already developed and began a discussion among attendees that went on during the following months with around half of the participants active in commenting. During the 2013/2014 school-year, two teachers attending T4T 2013 had students who created stories accepted for the final of the 2014 National Scratch Festival.

### 3. OPEN ACCESS TO OPEN DATA

In this section we briefly describe the “open access to open data” unit. It was meant as a contribution to enrich the presence of data management in schools still unsatisfactory though “data management is a central topic in computer science as well as in computer science education” [Romeike14]. The unit is an introduction to open data and open datasets of interest to students and teachers in the T4T area. Through a similar unit, on one side the teachers are suggested to work with their students on a project based activity similar to those the students shall work in the real life, on the other side teachers have the opportunity to point out

the informatics typical use of abstraction while performing a complex task such as database design. This unit also contributes to the discussion on which computer science aspects are most suited to the different types of schools other than programming since only focusing on programming is not sufficient. Moreover, it turns out to appear too technical to politicians and to education organizations that have decision power over school curricula.

Open data have been considered by B. Obama as the foundation of his government transparency with the December 2009 Open Government Initiative, (<http://www.whitehouse.gov/open/about>). Also in Europe, one of the strongest motivations of the large interest around open data is the transparency of the data originated by the public administrations as one can read in reports of the Europe’s Open Data website. Nowadays activities concerning open data mainly deal with publishing standards and legal aspects of privacy, yet only a broad diffusion of open access abilities shall guarantee to have a real data transparency. By open access we mean that most persons should have the ability of getting and using basic information from the open datasets.

Using open data in secondary schools is positive for the students in several aspects. It makes the students develop a project in its entirety and, normally, this kind of consistent real life projects motivates the students more than other exercises, develops their attitude toward sharing and allows more substantial examples than usual ones, since open datasets contain large quantity of data.

Also, open data contribute to grow civic-minded young people by showing them the websites where data are published, having them to look for data and choose which are of common interest by deciding with their teachers and classmates.

During T4T workshop the open data unit unlike introduction to programming unit, with the open data unit we deal with a unit showing a didactical methodology and related materials (data, examples, possible software) suggested to their colleagues by reference-teachers who already have developed the matter with their students. This unit is an example of a most appreciated peculiarity of T4T: several bottom up, i.e. from school life, suggestions are gathered together into a pedagogical activity.

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