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 the different needs of the 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 the 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 Education]: Computer and Information Science Education – computer science education

General Terms
Experimentation, Open data.

Keywords
Computing science, introduction to Informatics, programming, teachers’ training.

1. INTRODUCTION
In several countries, activities are growing toward defining a new presence of informatics in schools as proposed in [1]. While defining new curricula, in-service teachers training is a most compelling problem to face also considering that teachers have different needs. Many of them have little computing competencies if any, others mainly practice teaching of how to use Office suites or some other educational digital tools, others have been teaching for many years but 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.

From 2011 the Informatics department of the University of Torino partly supports the project Teachers for Teachers (T4T) with its free hands-on activities in the department laboratories. Intended audiences are teachers from any level and sort of k-12 education. The T4T framework, repeated every year, consists of one annual workshop and a number of follow up events. The workshop is carried out at the beginning of the school year usually over two days and offers several half day hands on activities, called units. Each attendee assembles the workshop program most suitable to her/him choosing among these units. The follow up events are carried out approximately one per month during the school year. All these in person meetings are supported by the T4T on line community. T4T-2012 and T4T-2013 had a contribution from Google CS4HS. The same framework of activities is going to be offered during the 2014/2015 school year.

T4T organisers are a working group of university researchers and in-service teachers (reference-teachers) who each year decide to focus on some computing concepts and develop activities for proposing to students these concepts in different pedagogical ways. The peculiar principle of the project is to focus on activities that attending teachers practice during the workshop and then can immediately propose to their own students. Because of the very short time that in-service teachers usually have, activities are proposed with a look-seen-modify-share methodology. During a workshop unit the trainees look at the experiences developed by the organisers and practice them. Then they are engaged in several ways, in particular by the reference-teachers, to modify contents offered and to develop their own versions. 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. Here we sketch two workshop units from T4T-2013 most representative of the different types of trainings. One concerns introducing computing by programming 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 storytelling [2]. The second one 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 only by teaching how to use some Office suite. The suggestion is to motivate the students to achieve the required competencies by developing a project based activity using the available open datasets.

2. CREATIVITY AND PROGRAMMING
The unit introducing computing to teachers aims at showing how programming can be a tool for expressing creativity. In previous years, the T4T units introducing computing concerned educational robotics using BeeBot and NXT, Logo and EasyLogo [3].
Inspired by Lawrence Williams’ site, a story telling activity using Scratch was organized during the T4T-2013 annual workshop with a first unit of four hours [2]. The T4T training model is based on guided hands-on activities structured according to a look-see-inside-modify-share methodology that for the unit we are describing went on along the following steps:

a. Two stories were shown both conceived and developed by English pupils finishing their primary school. They are the “Nocturnal animals” and the “Bacon and eggs” stories shown on the web pages of the Literacy from Scratch project [2].

b. A short introduction of the Scratch environment followed showing how each actor (called 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 in the story.

c. Attendees were then organized in two-three persons groups and requested, as a first activity, of translating into Italian the sentences in one of the English stories. 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, a story 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 his “Nocturnal animals” Russian translation.

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 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 each group found and used with the other attendees.

The stories uploaded during d and e steps are shared with the T4T community. They are very short yet the workshop gave to participants ideas for different activities, for where one can find projects already developed and began discussions among attendees that went on during the following months with around half of the participants active in the online community. After the workshop, three of the follow up meetings continued the work on Scratch. During the 2013/2014 school-year, two teachers attending T4T-2013 had students who created stories accepted for the final of the Italian Scratch Festival in May 2014.

Story telling deserves a final comment. At the beginning of the T4T-2013 workshop, Lawrence Williams gave one hour talk to all T4T participants turned out to be a valuable experience also for teachers expert in informatics. They saw activities different from those introducing programming based on traditional algorithms they are used to. Thus on the one hand the story-telling approach is suitable for beginners because we can assemble an enjoyable story using a code where the same or very similar patterns of easy instructions are used, on the other hand for digital experts can be a first step toward conceiving new types of activities for introducing computing more suitable to non technical schools.

3. OPEN ACCESS TO OPEN DATA

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). In Europe also, 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 (https://open-data.europa.eu/). T4T-2013 organisers considered that a real data transparency could be guaranteed only by a broad diffusion to most persons of the ability of getting and using basic information from the open datasets. Thus the “open access to open data” unit during T4T-2013 was conceived as a contribution to enrich the presence of data management in all types of secondary schools. Data management activities using open data increase students’ motivation because they consider data of a realistic size, rather than an “exercise” size, thus near to real projects and because one can find open datasets containing data on a context relevant to the students. Data considered during T4T-2013 refer to the digital equipments present in the Italian secondary schools from the Education Ministry datasets [4]. The activity concerns analyzing the datasets metadata, designing a relational database (db) through the several steps of a db design, import the data into the db and finally implement different questions. In secondary schools working on a project based activity makes the students to be active on all phases of a project, and, normally, this kind of consistent real life projects motivates them more than other exercises, and develops their attitude toward sharing and working in group to solve the complex problem. Besides, 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.

The “open access to open data” unit makes teachers focus on the informatics typical use of abstraction while performing a complex task such as database design emphasizing on the different levels of a database design (conceptual or user level, logical level, physical level). By showing how in database design the complexity of a problem is hidden through levels of abstraction we give a concrete example of how, in general, most computer application are build: by layers of abstraction, hiding away details not proper of a level and trying to reduce and factoring out details so that the programmer/user can focus on a few concepts at a time. 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. Because training units are initially conceived and developed by reference-teachers in the T4T organizers group and then discussed and evaluated with in-service teachers attending T4T.

4. REFERENCES


