

## Project “Microcourses for classes”

Serena Simoncini\*

ADDRESS: Via Cimabue 5 Livorno ITALY. Associazione culturale FOR.MU.LA.  
[www.teamformula.it](http://www.teamformula.it) SCHOOL: Scuola secondaria di 1° “G. Mazzini” Livorno

### 1. Introduction

I teach Maths and Science in a secondary school (11-14 years) and for many years I have been using the information lab during my lesson hours with the aim of catching up, developing and improving cognitive skills with my students trying to apply as best I can the TIC to my didactics. For some years I have been devoting in particular to the e-learning the effectiveness of which I have experiment first as a student then as an author and a tutor. I am a tutor of teachers for FORTIC 1 and 2 and a tutor in the course LOGO and Microworlds for the Garamond, but for two years I have been experimenting the power of cooperative-learning and e-learning addressed directly to children and young students too. I am admin of the platform [www.micromondi.garamond.it](http://www.micromondi.garamond.it) and [www.teamformula.it](http://www.teamformula.it)

Also the child, as the teacher has been till now can really be protagonist of his own learning, can choose his formative paths, can develop a certain studying autonomy if he is given the opportunity of interacting with other students and with a tutor in an on line environment arranged for cooperative learning. After years and years of courses to teachers of any level both in presence and at distance I have realised that a teacher, before being able to transfer what he is suggested to his students, has to feel sure that he has acquired all the relative competences and he doesn't dare apply the TIC to didactics unless he feels extremely expert on instruments and software. The Microworlds software, for instance, is a very versatile and flexible program which allows to find out various paths, all equally formative; in fact it can improve logical skills (interactive games, calculations...) the ability of orienting in the space (animations, geometry...), creativity, fantasy (multimedia pages, sounds, videos, music...) and first of all it can become an everyday instrument for the study and close examination of topics and disciplinary units (micro exercise books, hypertexts...) but the teachers, who approaches it, often feel that they are not so expert on it as to use it in their classes. That's why “Microcourses for classes” were born, just to let students and teachers develop for all the school-year, a cooperative-learning unit and share experiences, skills and knowledge.

### 2. “Microcourses\_baby” (Project Spirit)

**Even infants can learn from and contribute to the Web!**

This e-learning activity is aimed at children aged 4-7 and it is directed to the application of the pedagogy of Papert the inventor of LOGO language, also to children who cannot read nor write yet. You will probably wonder how it is possible to use in classes of so young children, a programming language which has a writing of instruction in sequence planned to structure a procedure which makes such little robot as a little turtle, perform any action. How is it possible to speak of written instructions, procedures with children who cannot write nor read yet? Well, Microworlds Junior gives children the possibility to set a logical sequence, that is to say a procedure, with simple icons instead of written instructions. If, for example, to make a turtle/shape (ex horse) move towards in certain direction in Microworlds I have to write a particular procedure which has the alternation of the instruction give shape, **forward** and **wait** and all this series of instructions put in sequence, let me animate the horse and make it gallop, well in Microworlds Junior the schoolbag (corresponding to the procedure page) of the turtle/shape will be a

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\* Corresponding author: e-mail: [serena.simoncini@istruzione.it](mailto:serena.simoncini@istruzione.it)

series of icons put in sequence: **helm** to change direction, **steps** to go forward, **clock** to wait a second two second... The child can set up his procedures trying to change the value of the steps or wait and create real animations. He, not only refines his manual skill, but he also starts to proceed through tries and errors, he tries different strategies and improves his logical and organizational skills simply playing with the turtle. Moreover the possibility to create pages in sequence with static elements and elements which vary such as the sky which becomes darker and darker or the stars and the moon which appear, can be the first step towards the creation of real cartoons. In addition, the fact that everything is shared with a lot of different classes of different schools let the children look around, learn and enjoy themselves even looking at the works and elaborates of other children. The project is divided into six units, each of them is published in the platform at a distance of one month. Each unit is composed of paper lesson (of course read by the teacher to the youngest children), two tutorial-videos in format .swf with audio included, forum to insert messages with answers, doubts, tutor's answers, other people's comments, a grid with specific skills and final script to put into the portfolio of the class.

These are the units in details:

❖ **Unit 1: "Welcome little turtles!"**

**Skills:** to recognize the three bars of the instruments of Mmj and the empty page - to become familiar with the mouse - to use the drawing instrument to "scribble" on an empty page - to be able to insert a turtle/shape and vary its dimensions

**Material:** paper unit - tutorial video and audio - pages drawn as samples.

**Application of the contents of the unit:** to open a new project containing at least a page of drawings and "colour bangles"

❖ **Unit 2: "Goodnight Spirit"**

**Skills:** to stamp the shapes – copy the first page into five or six more pages – use the palette of colours to make shades – insert new shapes into the various pages – insert a button into the first page containing the succession of pages

**Material:** paper unit – tutorial video and audio – project sample with pages which alternate in sequence giving the effect of the coming night

**Application of the contents of the unit:** to open a project "Spirit" and insert at least five or six pages with fixed elements and elements which change colour, shape and position

❖ **Unit 3: "The stars shine"**

**Skills:** to be able to insert into the page of the night various turtle/star – to be able to copy a shape already existing and modify it from the box of the drawing – to be able to open the schoolbag of the turtle/shape and set the instructions in sequence to make the shapes alternate

**Material:** paper unit – tutorial video and audio – sample pages containing turtle/shape which alternate (lighter and darker stars, bulbs which witch on, leaves which swing in the wind...)

**Application of the contents of the unit:** to insert into the project Spirit at least two or three turtles in the shape of a flashing star ( or a tree with at least two or three leaves which swing)

❖ **Unit 4: "Good morning Spirit"**

**Skills:** to be able to insert into a page turtle that, while moving, don't change shape (airplane, car, tractor...) – to be able to open the schoolbag of a shape and set the sequence of icons steps and icons wait to make the turtle move towards a direction – to be able to turn the head of the turtle using the icon helm

**Material:** paper unit – tutorial video and audio – sample pages with shapes that move towards a direction without changing shape (a plane flying in the sky, a car going along a road...)



Fig. 1 Page with drawings



Fig. 2 The stars shine

- Application of the contents of the unit:** to be able to insert into a page of the project Spirit at least two or three turtles planned to move along a direction without changing shape
- ❖ **Unit 5: “Now run Spirit!”**

**Skills:** to be able to open the schoolbag of the turtle/horse and alternate the three shapes of horse to the icons of steps and the ones of wait to make Spirit run along a direction – to be able to stop the movement of a turtle/shape at the contact of a certain colour

**Material:** paper unit – tutorial video and audio – sample pages containing shapes that create a complete animation

**Application of the contents of the unit:** to be able to insert into a page of the project Spirit, out of the fence, a turtle in the shape of a horse, turn its head in horizontal direction and make it gallop on the grass as far as the fence
  - ❖ **Unit 6: “Spirit’s friends”**

**Skills:** to be able to insert various turtle with different types of animations: swinging movements without changing shape, complete movements – to be able to insert into the schoolbag of a turtle/shape a stop at the contact of another turtle – to be able to insert a lot of horses, same inside and same outside of the fence

**Material:** paper unit – tutorial video and audio – sample project with complete animations

**Application of the contents of the unit:** to insert into the project Spirit a page containing more shapes planned to swing, more along a direction or come completely alive

**Four schools (Padova, Putignano, Roma e Venezia) have taken part into the activity during the whole school year 2005/2006 and the experience has really been unique, exciting and involving**

### 3. Microcourses 1

Experience of collaborative e-learning developed in 2004-2005 and 2005-2006 school years is aimed at children from 8 to 12 years old. In the Kairòs platform, five instructive paths have been created for all classes: Geomagic, Mathmagic, the Turtle animation, The Turtle games, the Micropapers (and The Turtle simulation will be added this year). Within a class, 5 groups are each able to take one of these paths for the whole school year. Each path is organized so as to develop disciplinary and cognitive skills by the use of LOGO language and “Microworlds 2.0 or EX” software. The teachers who have agreed to work on this project with their classes, even if not expert in either the language or software, have found guidance and an applicatory structure which has allowed them to successfully complete the activity.

**General aims:** acquiring autonomy in study and motivation to learning. Learning from sharing results and interacting in a virtual class. Improving methods of study, creativity and imagination. Improving logic abilities. Acquiring the basis for an original program. Improving content and disciplinary skills, particularly in geometry and arithmetic.

**Methodology:** each microcourse is divided into 6 units (Learning Objectives) and each of them is composed of: paper lesson to study off line – example of pages and projects – exercises and tests – final test with relative feedback – forum for debates. Each course has either a part on line (lessons to unload, writing messages, introduction of papers, reading comments and tutor’s answers, taking part in chats after appointment) and a part off line (to study the lectures notes, make tests and homework, practice).

**Portfolio:** in the platform each group has its own portfolio, an insert in which the paper and exercises are collected. The portfolios are available to all the members of the same Microcourse.

**Evaluation:** each unit (L.O.) provides two grids of evaluation, one to test the knowledge and mastery of the cognitive schemes adapted by the students and one to test the quality of the product, that is to say the final test. Ten schools all over Italy, fifteen classes, twenty teachers and 373 students have taken part in this activity. It has proved extremely exhilarating and instructive to all involved.

#### **Project structure**

The project is made up of six Microcourses for children from 8 up to 14 years old, that is to say children from the third year of primary school up to those of the third year of secondary.

Microcourses are the following:

- **Geomagic**
- **Mathmagic**
- **The Turtle-games**
- **The Turtle-animations**
- **The Turtle-simulations (new)**
- **The micro-notebooks**



**Fig. 3** Home page of “The Turtle-games”

Each course is divided into 6 learning units (see Methodology) and only the first two are shared by all courses (Projects and pages and Tools). All the others aim to create 6 different learning paths and to gradually strengthen different skills and expertises.

Indeed, each microcourse allows only the general expertises but also the specific skills acquisition.

Children of classrooms who have agreed with this project have chosen by their own the most appealing course (in any case the teacher had to guide them so as to gather 6 miscellaneous groups). From the first moment children realized they were going to belong to a virtual classroom, and that, in addition to their “live classmates” they would have shared this new adventure with other virtual classmates. They suddenly learned who to interact with the platform and with the online tutor.

At the beginning they enjoyed writing introductory messages, asking information about the tutor and their new classmates. Then, once confident with the forum, they have experienced the exciting situation of a chat, they started to download, read and apply the paper lessons, they started to insert their first exercises into the portfolio .... They slowly have become autonomous in the study of every U.A. till attending some lessons even from home.

They had the chance to “peep” and “cribbing” the virtual classmates, They have been able to read the questions of the other students and the answers given by the tutor or by the more experienced students, they had the possibility to explain to them or to show them their developments. All this contributed to create a really interactive and learning atmosphere in the platform.

#### **General aims of the project**

- to be more autonomous in study and to be more motivated for learning.
- To learn from the sharing of documents, from difficulties, from questions and answers, to interact in the virtual classroom.
- To strengthen a method of study, creativity and imagination.
- To strengthen logic with the acquisition of a planning language (LOGO)
- To acquire the basis of an author program
- To strengthen the disciplinary contents and expertises especially in geometry and mathematics.

#### **Specific aim of each microcourse**

##### **Geomagic**

- Acquire the basis for LOGO graphics planning

- To be able to plan a procedure for the realisation of geometric figures
- Acquire concepts as:
 

Iteration and “ricorsione”	polygons and spirals
rotations, translations and symmetries	angles, axis and cartesian plan
variables	similar figures

### **Mathmagic**

- Acquire LOGO planning bases for interactivity, calculus skills and logic.
- Plan a procedure for making calculus, from a right angled area to a cylinder’s volume, from the multiplication table to the calculation of the daily kilocalories consumption.

### **The turtle games**

- Acquire the LOGO planning bases for drawing an interactive game
- To be able to plan one or more procedures in order to create:
  - riddles
  - puzzles
  - filling the blanks
  - tests and chronometers
  - snakes and ladders or know-all
  - cross words
  - labyrinths
  - word games

### **The Turtle-animations**

- Acquire LOGO programming bases for animating the turtles
- Be able to plan one or more procedures in order to:
- Make an object swing changing only its shape.
- Be able to start more than one animation simultaneously

### **The Turtle-simulations**

- Acquire LOGO programming bases for to feign physical, chemical or biological phenomenons

### **The Micro-notebooks**

- Acquire a method of study
- Be able to draw a conceptual map in Micromondi page.
- Be able to make links to in-depth study pages on the “concept-words”, re-creating multimediatially the paper pages of a notebook.
- Be able to describe and to explicate the knowledge acquired even by invented tests or questionnaires.

### **Method and resources:**

- Each course is divided into 6 learning units and every unit is composed by the following contents:
- paper lessons that can be downloaded and printed in order to be studied off line (in class or at home). In fact each lesson uses a simple language, specific for children who have just learned to

write and read. Each lesson is also rich in images that support explications and help to make them clearer and more immediate.

- Examples of file or papers to download so as that children can try and make practice before applying.
- Eventual explanatory tutorial video.
- Exercises and various tests in itinere
- Final test with relative feedback
- Chat forum by appointment

The first two U.A. are shared by all levels. They deal with the software use: how to open a project, how to organize pages, how to use tools or drives, how to insert an object into a page...while the other U.A change depending on goals they aim to reach.

Even the language used in the tutor's answers is naturally simple, immediate and rich in visual explications.

### **Digital portfolio**

A project called Mio\_portfolio is the first lesson's final due. Such a project had a personalized first page drawn by the group while the other pages, whose name was the date of their issue, dealt with the subjects learned in that day, in addition to comments on improvements, on doubts, on failures.... It was a very diary that every time children inserted in the portfolio so as that all the others could be updated on their improvements.

Naturally, all exercises requested and all the Micromondi projects have been included in the platform.

### **Contents**

Here below you find the Micromondi Units subdivision:

#### Geo-magic

Module 1 – projects and pages

Module 2 – tools

Module 3 – Logo Language for angles, polygons and circumferences

Module 4 – procedure for graphics teaching

Module 5 – cartesian axis, coordinates and symmetries.

Module 6 – variables and similarity, spirals.

#### Mathmagic

Module 3 – Logo language for easy calculus (multiplication tables, sums)

Module 4 - procedure per calculus

Module 5 – problems and their solution

Module 6 – calculus for geometric problems or other situations.

#### The turtle-animations

Module 3 – Logo Language to make an object swing without movement

Module 4 – Logo Language. to make a shape move without modifications

Module 5 – Logo Language for complete animations

Module 6 – animations procedures and sliders use

#### The turtle-games

Module 3 – Logo Language for questions and tests

Module 4 – treasure hunt (envelopes and questions)

Module 5 – space games (or snakes and ladders)

Module 6 – rebus, puzzles, riddles, crosswords...

#### The micro-notebooks

- Module 3 – a help for study
- Module 4 – drawing “covers” and “maps”
- Module 5 – in depth-study pages
- Module 6 – Logo Language for questions, tests and quizzes.

### **Time**

Each microcourse is composed by an online and an off line part

- **On line:** the class can connect to the Platform once or twice per week. With this frequency children can download documents, can insert messages, they can read the answers or insert homeworks and practice exercises. In addition to this it is possible to plan, within the school hours, some chats by appointment (one every 15 days for example) in rotation ( for example, during the morning all the five groups could enter into the chat in rotation, one group per hour). The connection to the platform must in any case be organized on the base of the availability and the plans of the teacher and in accordance to the schools’ facilities.
- **Off line:** the documents downloaded, all the tests, exercises, projects and ipertests can be made in lab but non on line. Also the use of lab must be at the teacher’s discretion in compliance with his method of work (he decides whether to bring the whole class or just few little groups per time, whether to share the lab or to use it by his own). In any case, a part of the work can be made by the children themselves at home (nowadays mostly everyone can connect to the web) and in complete autonomy.

### **In itinere evaluation**

At the end of every lesson, teachers have a series of grids to evaluate the final results of each group. By the use of those grids, teachers evaluate the following:

- The students’ consciousness of mental scheme (and the relative grid to be filled in)
- The command of the mental scheme ( on the base of the procedure expected)
- The final results levels (with the indication of even the minimum levels)

Moreover, teachers have an observation scheme where they can write and check all the systematic observations relative to the group activities. They can thus evaluate how the Cooperative learning helped to practice the communication skills.

In 2004/2005 and 2005/2006 more than 400 students from 20 classes of Italian schools took part in the Project “Microcourses for classes”

In October and November 2006 three simulation – courses will be instituted in the platform:

[www.teamformula.it](http://www.teamformula.it) **Parents and teachers will be able to take part in these courses through a free registration.**

During these simulations people will try the educational power of an e-learning activity.

Learning Object (Unit) 1 and 2 will be downloaded and people will be able to take part in Forum in order to Chat, to share doubts, questions, experiences and productions.

This activity will be done again by teachers in their own classes from the beginning of December 2006 on.

Serena Simoncini