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DIYLab Specifications:
Spanish Primary
& Secondary School

(English version)

DIYLAB

esbrina — Universitat de Barcelona — Comisión Europea — Lifelong Learning Programme

2.1. DIY Lab Specifications - Spanish Primary & Secondary School

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INTRODUCTION

This report reflects the process and the outcomes of the phase: Formation in support of DIY Education and design (WP2), of the DIY Lab project. Its aim is to synthesize the explorations and decisions made by the primary and secondary teachers of Escola Virolai who will be in charge of the implementation of DIYLab (WP4). The formation is part of the action-research cycle initiated in WP1.

The activity, from its planning to its development, took place between July and December 2014. The work with the 13 primary[1] and secondary teachers[2] and the three administrators[3], with the support of 6 researchers of the University of Barcelona[4], took mainly place through 12 in situ sessions from October to December.

1. Development of the formation

The formation was based on a dialogic processes that began by review the background and experiences of the participants and analysis of available literature (McKay, 1998; Spencer, 2005; Guzzetti, Elliott & Welsch, 2010; Knobel & Lankshear, 2010: Kafai & Peppler, 2011) and practical examples of DIY[5]. In this way we endeavoured to ensure the sustainability of the philosophy of the project beyond its completion. The undertaking of the formation was considered a collective success by all the participants[6].

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3 Coral Regí, headmaster; María José Miranda, secondary school coordinator and Paloma Llaquet, primary school coordinator.

4 Juana M. Sancho, Fernando Hernández, Maria Domingo, Xavier Giró, Anna Majó and Judit Onsès.

5 http://www.diyshow.es/que-es-diy-show. Videos about DIY.

6 The Escola Virolai teachers and those of the University of Barcelona organised a joint session to share our processes in which both the value of the results and the collaboration between the two institutions was highlighted.

1.1. General organisation

The proposal established for the formation period and the topics to be dealt with (see table 1) were common for the whole consortium. A total of 12 sessions took place from October to December, each lasting 90 minutes. These sessions were complemented by individual and collective work, which has shared through a virtual environment.

EXPLORATORY MOMENTS			DECISION-MAKING
1. What do we understand by DIY philosophy?	**2. DIY philosophy and education**	**3. Technological tools and resources**	**4.Pedagogic specifications**
Common reflective focus in relation to the DIY philosophy.	What happens when we introduce the DIY philosophy into an educational institution?	Debates around the technological design of the DIYLab.	When and where will the DIYLab take place? How is it integrated into the syllabus?, etc.
RESULTS			
Pedagogic principles	**Use of the ICT in DIYLab**		**DIYLab & Syllabus + Implementation Plan**

Table 1: Distribution of the contents into four blocks, agreed upon with the consortium members.

The working sessions took the form of *"do it yourself together"* workshops (in situ and virtual), to ensure that the questions, ideas, proposals and reflections were generated in a context of collaborative learning. This form of work has enabled all the participants to make significant contributions to the shaping of the pedagogic and technological implications of the DIYLab, as well as to the implementation plan.

This report is based on all the evidence gathered (video, photos and text) during the meetings and also on the contributions made in the virtual space.

2. Pedagogic principles

The reflections on the DIY philosophy were based on practical examples that illustrated something teachers had learned by themselves throughout their life. The shared experiences were related to personal hobbies like sports and learning experiences both in formal and non-formal spaces. Sharing these experiences allowed us to start exploring some characterizations of the DIY philosophy, such as:

- Learning to know by yourself

- Starting from one's own interests

- Narrate our own knowledge

- Shareing knowledge with others

- The interest and the need to focus on motivation

- The presence of failure in the learning process

- Skills and abilities necessary for independent learning.

From this starting point, some of the educational principles of the project were defined.

2.1 The DIY philosophy in relation to formal education

Concepts emerged from debates based on the documents shared in the virtual space and the personal experiences helped to substantiate the design to the implementation of DIYLab in primary and secondary education.

2.1.1 Concepts explored

The items listed below are considered most relevant:

- Self-knowledge

- Self-regulated learning

- Recognition

- Technology

- Self-confidence

- Learning vs. enjoyment

- DIY Community

- Motivation

- The relation between inside and outside school

- The role of families

- The curriculum

- Evaluation

- Time and space variables

2.1.2 Emerging tensions

Regarding the implementation of DIYLab some transversal tensions were detected. We decided to address them openly in order find the best possible solutions. The most important were:

- **How to lead a group:** what should the teacher do to guarantee a better group performance? How can the teacher move a group?

- **What should the role of teacher in relation to the students?** The roles of the teacher and the student must change. According to the participants, teachers should:

  - Motivate

  - Generate new mechanisms for fostering authentic learning

  - Have the ability to find answers and teach students to look for them.

  - Formulate questions and teach students to formulate them.

  - Facilitate learning situations.

  - Drive processes

  - Be mentors / guides

  - Set an example

  - Be receptive to students' concerns

  - Take into account the out-of-school contexts

  - Generate and facilitate of inquiry-based processes.

- **Difficulties:** Some students find it rather hard to take initiative.

- **Uncertainty:** This has been a recurring feeling when regarding the implementation of DIYLab in the classroom. The bases of teachers' practice have been questioned, while at the same time participants understand the necessity of establishing new frameworks for action.

- **Choice:** The possibility of choosing and deciding has been identified as a key issue in the project. It is understood that working with the DIY philosophy does not mean that the students can choose whatever they want to interact with, sometimes simply because they do not have the capacity to do so and others because there is content that needs to be learned. Therefore, working with the DIY philosophy does not mean that students can merely follow their own interests; instead it refers to how students need to feel responsible for their learning.

2.1.3 Considerations about the introduction of DIY at school

The formation process revealed the importance of taking into account aspects such as: self-knowledge, self-regulated learning, self-confidence, recognition, learning community, motivation and the relationship between inside and outside school.

Regarding the relationships between the different actors involved in the project, attention should be paid to:

- Families – School. It seems essential to achieve a fluid communication between these two groups to foster a sense of mutual trust so that the project becomes successful for everyone.

- Teacher – Student. In the formation process it is agreed that teachers must: define and demarcate what should be learnt, and create and design a framework, an environment and a work dynamic. They also should accompany, advise and redirect the learning process when necessary. They are the ones who should provide the tools for evaluating the process, the progress and the results. All this should be carried out with an open-minded attitude and a disposition that allows teachers to admit to and learn from the errors.

It is accepted that up to a certain degree of **uncertainty**, as a controlled and shared feeling, can become productive. Likewise with the possibility to **choose** or make decisions, as an attitude that ensures the achievement of the minimum required knowledge, while also facilitating students' choice. In connection with **assessment**, the group proposes to pay attention to "what they have learned" instead of "what they should learn," and distinguish between **perception** ("I think that ...") and **transformation** ("in what they have changed").

Finally, everybody agrees on the need to find existing moments and spaces in the in the school in which the student may have a high degree of autonomy. Connecting DIYLab with prevalent aspects of the school culture seems a promising way of guaranteeing its sustainability.

3. Use of the ITC in the DIYLab

3.1 Digital tools

The current policy of the school is to use Open Source resources. Specifically, the school is committed to working with *Google apps* and the services they offer. These apps cover the school's needs: they are collaborative tools, have automatic updating and are free. In general, teachers do not deeply know any particular application but, as revealed in WP1, all of them try to use the ones needed to undertake their daily work. However, the prevailing feeling, given the vastness of the current possibilities of digital tools and resources, is of disorientation.

In this exploratory phase, a general vision of the existing resources (see image 1) and a document that detailed how each of them could help create DIYLab projects was produced. For example: a) photography and video resources (Stop Motion, Time Lapse, Machinima, Animació 2D, Art 2D, Animació and Art 3D); b) audio and music resources (production of podcasts, musical production); c) software and video games (Minecraft, Kerbal Space Program, Portal 2, Stencyl and GDevelop, Scratch); d) web production and digital art (Processing, Webmaker, WordPress).
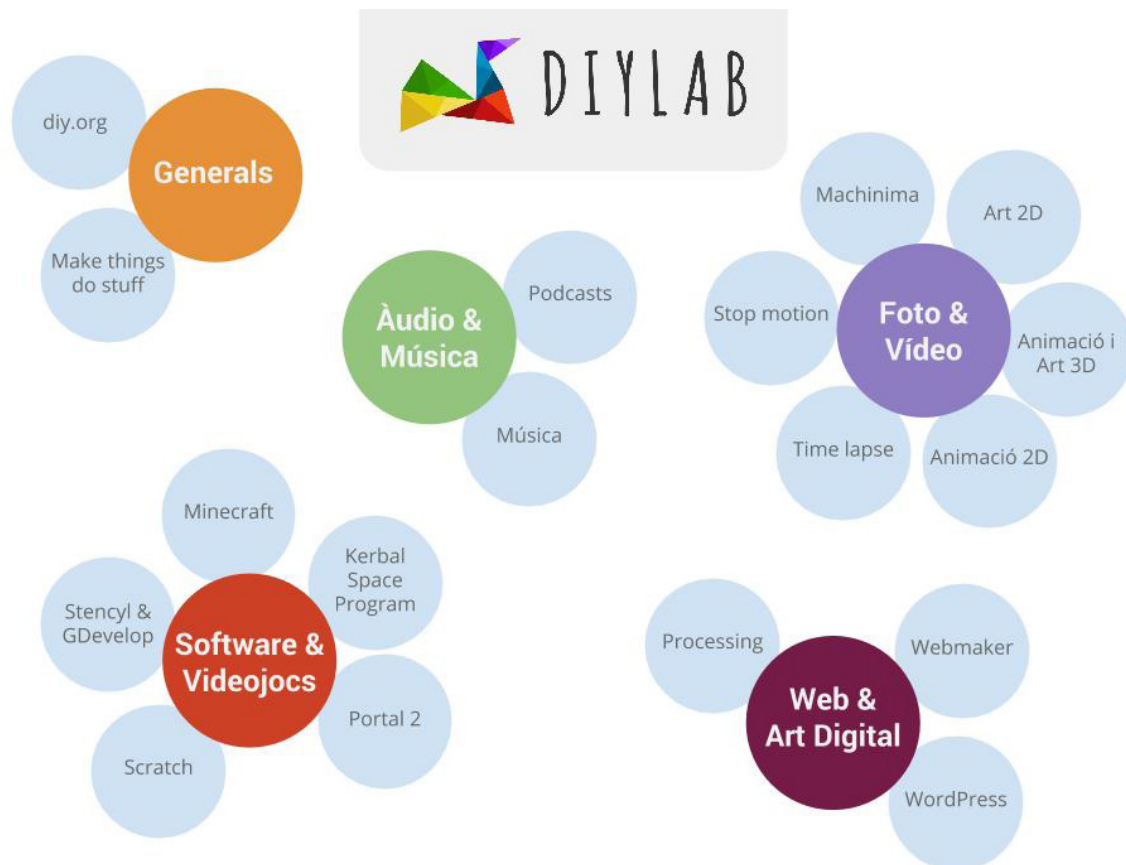
Image 1: Map of some possible tools and resources.

The group decided to take an in-depth look at three of the tools proposed: ***Stopmotion, Webmaker*** and ***Wordpress***. In point 5, the digital applications intended to be used in the implementation phase of DIYLab are specified.

3.1.1 Narrative resources

Reclaiming the desire to narrate and share knowledge, the group reflected on the narrative formats, agreeing with the need of distinguishing between the tools to be used and the message to be shared. In the case of DIYLab, the learning process is important for:

- Redirecting the orientation of the activity if things do not work.

- Being aware of what you are doing.

- Learning to organize oneself.

Regarding the student productions included in the DIYLabHub, the following minimum conditions were agreed upon:

- They must not last longer than five minutes

- Their content has to be comprehensible for a person not connected with the project.

- Have a visual component.

- Move between the descriptive and the reflective.

- Have a storyboard as a base.

- The title and author or authors are specified.

- Have a summary.

- Be subtitled in English.

4. DIYLab & Curriculum

In order to determine the specifications for the implementation of DIYLab in the class-rooms, the first step was to locate possible scenarios. The goal is to take advantage of the flexibility allowed by the current curriculum and locate existing moments and situations. To encourage reflection, the following questions were raised:

- How to visualize this implementation?

- What conditions are needed to be able to promote this philosophy?

- The type of curriculum we have now is more convenient?

- With the school organization we have now, what can we do?

- What would we do with other conditions?

- What else do we need?

The goal is to be able to respond to the following aspects:

- WHERE: at what times and in which contexts of the syllabus would we implement the DIYLab?

- WHEN: what timing do we forecast: continuous hours, fractioned time, specific moments, etc.?

- HOW: ideas about how the project can be implemented.

- WHO: who should be involved: one teacher per classroom, several, external agents…?

- WHAT: what we need to be able to work. What tools and resources.

- EVALUATION: how we envisage it.

- DIFFICULTIES AND ADVANTAGES: of implementing the project in the university.

The result was a first draft of these scenarios.

5. Plan for the implementation of DIYLab

For the implementation of DIYLab in primary and secondary education, five basis points were determined.

· There must be a basic **focus.**

· It involves **co-operation.**

· **Technologies** play an important role, although they do need not be the centre.

· It involves creative decisions, getting out of the norm. **Adapting, transforming, experimenting.**

· It involves feeling as an **author.** (i.e., having agency over one's learning process).

5.1 DIYLab in the 5th grade of the primary education

DIYLab will be implemented in the context of two transversal and interdisciplinary projects: "Tivo Creativo" (with a structure based on three phases: analysis of the challenge, idea generation and evaluation of ideas); and "We are geographers."

General Aims

· Experimenting with DIY philosophy within the established projects, identifying what have been the key elements in facilitating its development.

· Designing, planning and developing the projects and assessing if they have been consistent with the DIY philosophy and if learning has been significant for the students.

Digitals skills

· Select, use and program digital devices in accordance with the tasks to be performed.

· Use the basic functions of editing applications, numerical data processing and multimedia presentations.

· Use software for drawing and editing still images, sound and moving image.

· Search, compare and select digital information considering various sources and digital environments.

· Constructing new personal knowledge through information processing strategies with the support of digital technology.

· Organize and use personal digital learning environments.

· Conduct virtual interpersonal communications and digital publications.

· Perform group activities using virtual tools and environments for collaborative learning.

Timing

- **Second quarter:** "Tivo Creativo" (January-March 2015).

- **Third quarter:** "We geographers" (April- June 2015).
6 hours / 10 weeks each quarter: Or Monday and Wednesday 11: 30 to 13:30 or Friday: 15:00 to 17:00.

Tools and resources

Participants will have the following technological resources:

- Laptops

- Tablets: applications such as video, audio, image, QR...

- PDI

They will make use of tools such as:

- GoogleDrive, to work collaboratively

- Padlet as a portfolio, or PPT to make presentations

- Microsoft Word for word processing

- Google, as Internet search tool

Human resources:

- 3 teachers / 2 classrooms

Evaluation

The evaluation will be based on rubrics in order to:

- Assess the work process

- Evaluate the final product

- Self-assess the working groups

- Co-evaluate among students

5.2 El DIYLAb in the third year of secondary education

The DIYLab will be implemented within the "Smart Cities" interdisciplinary project which involves languages, the natural and social sciences and technology. This project addresses the challenges faced by 21st century cities through classroom activities that pose real or similar situations to the ones found in a modern city.

Aims

- Work with students the curriculum content of the subjects involved with an interdisciplinary approach to give them unity and coherence.

- Make a motivating proposal for students.

- Help students to develop the basic skills necessary for the formation of autonomous citizens capable of addressing the challenges of contemporary society.

- Help to discover the advantages of self-learning through activities based on DIY philosophy.

- Understand and learn how to use software and hardware associated with the so-called Internet of things (IoT) and its applications in Smart Cities.

Methodology

The activities will be based on a DIY philosophy. Here, the student learns while making things. The teacher proposes problematic situations that students must solve through research and experimentation. The teacher accompanies the students' process by advising them and proposing new challenges to help them to improve their learning, showing them, for instance, how breaking a complex task into simpler tasks help to find the solution to the original problem. Students work with cooperative groups to achieve their goals.

Digitals skills

- Select, configure and program digital devices according to the tasks to be performed.

- Use text editing applications, multimedia presentations and numeric data processing for the production of digital documents.

- Use basic applications for editing image, sound and moving images in order to produce digital documents.

- Construct new knowledge through personal strategies of information processing with the support of digital applications.

- Participate in virtual interpersonal communication environments and publications to share information.

- Conduct group activities using virtual tools and collaborative learning environments.

- Perform actions of citizenship and personal development, using digital resources of contemporary society.

Tools

- Internet search engines.

- Google Apps (Sites, Drive, Gmail) as collaborative learning tools.

- Video Editing Tools.

- Code Academy: http://www.codeacademy.com (platform for independent learning of computer programming).

- Raspberry Pi: http://www.raspberrypi.org/ (mini-computer specially adapted for applications of Internet of things).

- Sensors and actuators.

- Sentilo: http://www.sentilo.io (platform for monitoring sensors and actuators used in Barcelona)

Timing

- 12/2014 – 2/2015: Preparatory activities: introductory course in programming with Python via the platform Code Academy.

- 1/2015 - 3/2015: Specific activities implemented in Smart cities

- Human resources: 9 teachers / 2 classrooms

Activities

Related to Social Sciences

The learning experiences will be based on the idea that a city is nothing more than a community in which its members must establish relationships based on respect, harmony, tolerance and all those values we declare as basic and invulnerable.

Related to Natural Sciences

The activities will be based on the premise that cities have to take into account criteria for health (e.g. have facilities that enable the sport at various levels), the environment, energy and mobility.

Related to Technology

Students will learn the programming language Python that, on the one hand, is easy to learn and, on the other, has infinite possibilities of application. To learn the basic syntax of language, the platform Code Academy (http://www.codeacademy.com) will be used. It allows self-learning based on an interactive and auto-corrective course where the teacher can follow the evolution of the learning process.

Related to Foreign Language

It has been proposed that part of the final product is a report (presented orally or in writing in English) where students explain the objectives and content of their projects, make a reflection on the process and evaluate their own learning.

Related to Languages and Literature

The development of the communicative competence will be fundamental. In addition, teachers and students will take advantage of the fact that literature has masterpieces of cities as protagonists, what is a magnificent way of exploring them.

Evaluation

The evaluation will be performed through rubrics. The evaluation process consists of three phases: peer evaluation, self-assessment and assessment by teachers.

Final products

Students will prepare a final report of the project and will make a public presentation to families and guests where they will show their findings, display the artefacts built and explain their learning processes. The use of English as the language of communication will be encouraged.

6. To conclude

As reflected in this report, the set of goals of the formation for the introduction of the DIY philosophy in education and the design of the DIYLab have been achieved. The activities undertaken by primary and secondary teachers, the school administrators, together with the university researches, have enabled to concretise the plan of action in its organisational, pedagogic and technological dimensions, which will be put into practice in the next stage of the project (WP4).

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